
NO. T040-822

ISSUED: JAN. 12, 2011

REVISED: _____



**HOSHIZAKI
UNDERCOUNTER
REFRIGERATOR/FREEZER**

MODEL

RTE-120/150/180SNA

RTE-120/170SDA-GN

FTE-120/150/180SNA

FTE-120/170SDA-GN





SERVICE MANUAL

CONTENTS

PAGE

I. GENERAL INFORMATION -----	1
1. SAFETY INSTRUCTIONS -----	1
2. DIMENSIONS/SPECIFICATIONS -----	3
[a] RTE-120SNA -----	3
[b] RTE-150SNA -----	4
[c] RTE-180SNA -----	5
[d] RTE-120SDA-GN -----	6
[e] RTE-170SDA-GN -----	7
[f] FTE-120SNA -----	8
[g] FTE-150SNA -----	9
[h] FTE-180SNA -----	10
[i] FTE-120SDA-GN -----	11
[j] FTE-170SDA-GN -----	12
II. TECHNICAL INFORMATION -----	13
1. WIRING DIAGRAM -----	13
[a] RTE SERIES -----	13
[b] FTE SERIES -----	14
2. REFRIGERATION CIRCUIT -----	15
3. ELECTRONIC CONTROLS -----	16
[a] SET POINT TEMPERATURE -----	16
[b] CABINET TEMPERATURE DIFFERENTIAL -----	16
[c] DEFROST CYCLE -----	16
[d] DEFROST COMPLETION TEMPERATURE -----	16
[e] CLOGGED CONDENSER DETECTION TEMPERATURE -----	16
[f] TEMPERATURE DISPLAY CYCLE -----	16
[g] COMPRESSOR SOFT START -----	17
[h] CABINET TEMPERATURE AND TEMPERATURE DISPLAY -----	17
[i] RESOLUTION -----	18
[j] SET POINT TEMPERATURE AND CABINET TEMPERATURE -----	18
[k] CHECKING AND ADJUSTING SET POINT TEMPERATURE -----	18
[l] MANUAL DEFROST -----	19
[m] CANCELLING SOFT START -----	19
4. ERROR CODES -----	19
[a] EEPROM WRITE ERROR (EA) -----	19
[b] EEPROM VERIFY ERROR (ED) -----	20
[c] CABINET TEMPERATURE TOO HIGH (E1) -----	20
[d] CABINET TEMPERATURE TOO LOW (E2) -----	21
[e] DEFROST CYCLE TOO LONG (E3) -----	21
[f] ABNORMAL PRESSURE (E4) -----	22
[g] CONDENSER CLOGGED (E7) -----	23
[h] DEFROST THERMISTOR DEFECTIVE (E8) -----	23
[i] CLOG THERMISTOR DEFECTIVE (E9) -----	24
5. ENERGY SAVING CONTROL -----	24
[a] STANDARD MODE -----	24
[b] ENERGY SAVING MODE -----	25
[c] CABINET TEMPERATURE CORRECTION -----	25

6. TIMING CHART	26
[a] STANDARD MODE (RTE series).....	26
[b] ENERGY SAVING MODE (RTE series)	27
[c] STANDARD MODE (FTE series)	28
[d] ENERGY SAVING MODE (FTE series).....	29
[e] FORCED STARTUP (CANCELING SOFT START).....	29
III. SERVICE DIAGNOSIS.....	30
1. FLOWCHART	30
2. SERVICE DIAGNOSIS	31
3. CONTROLLER BOARD.....	33
[a] SERVICING CONTROLLER BOARD	33
[b] CHECKING THERMISTOR	34
IV. REMOVAL AND REPLACEMENT OF COMPONENTS	36
1. REFRIGERATION UNIT.....	36
2. REFRIGERATION CIRCUIT	37
[a] REFRIGERANT	37
[b] COMPRESSOR.....	37
[c] EVAPORATOR AND DEFROST HEATER	37
[d] CONDENSER	39
3. CONTROL BOX	39
4. FAN MOTORS	39
[a] CONDENSER FAN MOTOR.....	39
[b] INTERIOR FAN MOTOR	40
5. THERMISTORS	40
[a] INTERIOR THERMISTOR	40
[b] DEFROST THERMISTOR.....	40
[c] CLOG THERMISTOR	41
6. DOOR GASKET	41
[a] REMOVAL	41
[b] REPLACEMENT	41

Symbol	Meaning
	Keep Dry
	Cabinet Temperature
	Increasing Temperature
	Decreasing Temperature

I. GENERAL INFORMATION

1. SAFETY INSTRUCTIONS

The following instructions contain important safety precautions and should be strictly observed. The terms used here are defined as follows:

WARNING: There is a possibility of death or serious injury to the service person and a third party or the user due to improper service operations or defects in serviced products.

CAUTION: There is a possibility of injury to the service person and a third party or the user or damage to their property* due to improper service operations or defects in serviced products.

* The term "damage to their property" here refers to extensive damage to household effects, houses and pets.

WARNING

1. Always ask the user to keep children away from the work area. They may be injured by tools or disassembled products.
2. When there is no need to energize the unit during disassembly or cleaning, be sure to unplug the unit or disconnect the main power supply before servicing the unit to prevent electric shocks.
3. If the unit must be energized for inspection of the electric circuit, use rubber gloves to avoid contact with any live parts resulting in electric shocks.
4. Keep the following in mind when servicing the refrigeration circuit:
 - (1) Be sure to recover the refrigerant. Do not discharge it into the atmosphere. It will affect the environment.
 - (2) Check for any flames in the vicinity, and ensure good ventilation.
 - (3) If the refrigerant should leak in servicing, immediately put out any fire used in the vicinity.
 - (4) When unbrazing the refrigeration circuit connections, check that the circuit is completely evacuated. The refrigerant may produce a poisonous gas when coming in contact with an open flame.
 - (5) Do not braise in an enclosed room to prevent carbon monoxide poisoning.
 - (6) In case of a refrigerant leak, locate and repair the leaking part completely before recharging the refrigerant and checking for further leaks. If the leaking part cannot

be located, be sure to check again for further leaks after recharging the refrigerant. Leaked refrigerant may produce a poisonous gas when coming in contact with an open flame of a gas cooking stove or a fan heater.

- (7) Before servicing, check the surface temperature of the refrigeration circuit to prevent a burn.

5. Keep the following in mind when making electrical connections:

- (1) Check for proper earth connections, and repair if necessary to prevent electric shocks.
- (2) Always use service parts intended for the applicable model for replacement of defective parts. Use proper tools to secure the wiring. Otherwise abnormal operation or trouble may occur and cause electric leaks or fire.
- (3) Check for proper part installations, wiring conditions and soldered or solderless terminal connections to avoid fire, heat or electric shocks.
- (4) Be sure to replace damaged or deteriorated power cords and lead wires to prevent fire, heat or electric shocks.
- (5) Cut-off lead wires must be bound using closed end connectors or the like, with their closed ends up to avoid entrance of moisture that could lead to electric leaks or fire.
- (6) After servicing, always use a megohmmeter (500V DC) to check for the insulation resistance of at least 1 megohm between the live part (attachment plug) and the dead metal part (earth terminal).
- (7) Do not service the electrical parts with wet hands to prevent electric shocks.
- (8) The capacitors used for the compressor and other components may be under high voltage and should be discharged properly before servicing.

CAUTION

1. After servicing, follow the instructions below:

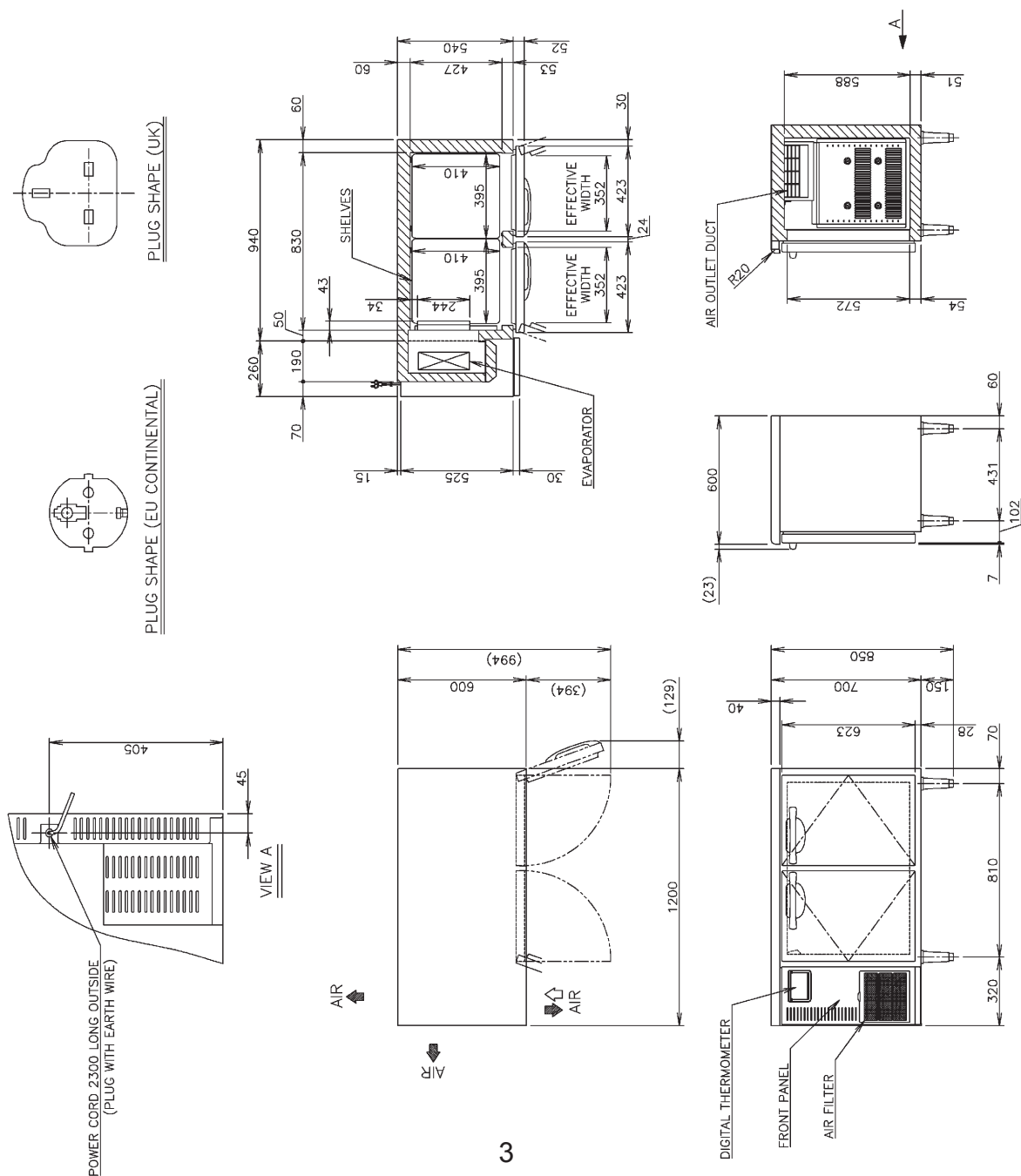
- (1) Always check the unit for proper operation before finishing services.
- (2) Be sure to reassemble the parts completely. Loose assembly of such parts as control box cover may cause entrance of vermins resulting in a short circuit between terminals and possible ignition.

2. DIMENSIONS/SPECIFICATIONS

[a] RTE-120SNA

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RTÉ—120SNA
POWER SUPPLY	1 Phase 220~240V 50Hz Capacity:0.43kVA(1.9A)
AMPERAGE	Rated 1.4A Starting 6.8A
ELECTRIC CONSUMPTION	Motor 195W(Power Factor60%) Heater 183W Refrigeration 213W Defrost 190W
HEAT REJECTION	280W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	222L
OUTSIDE DIMENSIONS	W1200×D600×H850(850—880)mm
INSIDE DIMENSIONS	W830×D427×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 110W
CONDENSER	Fin and Tube type, Air—cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC SAFETY PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 77kg (Gross: Approx. 86kg)
PACKAGE	Carton W1265×D680×H850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperature:5~43℃ Voltage Range:Rated Voltage±5%

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pull-down temperature at ambient temperature of 43°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 43°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12°C is guaranteed at ambient temperature of 30°C.
4. Product Code : T043 (For CONTINENTAL PLUG)
T043-D001 (For UK PLUG)

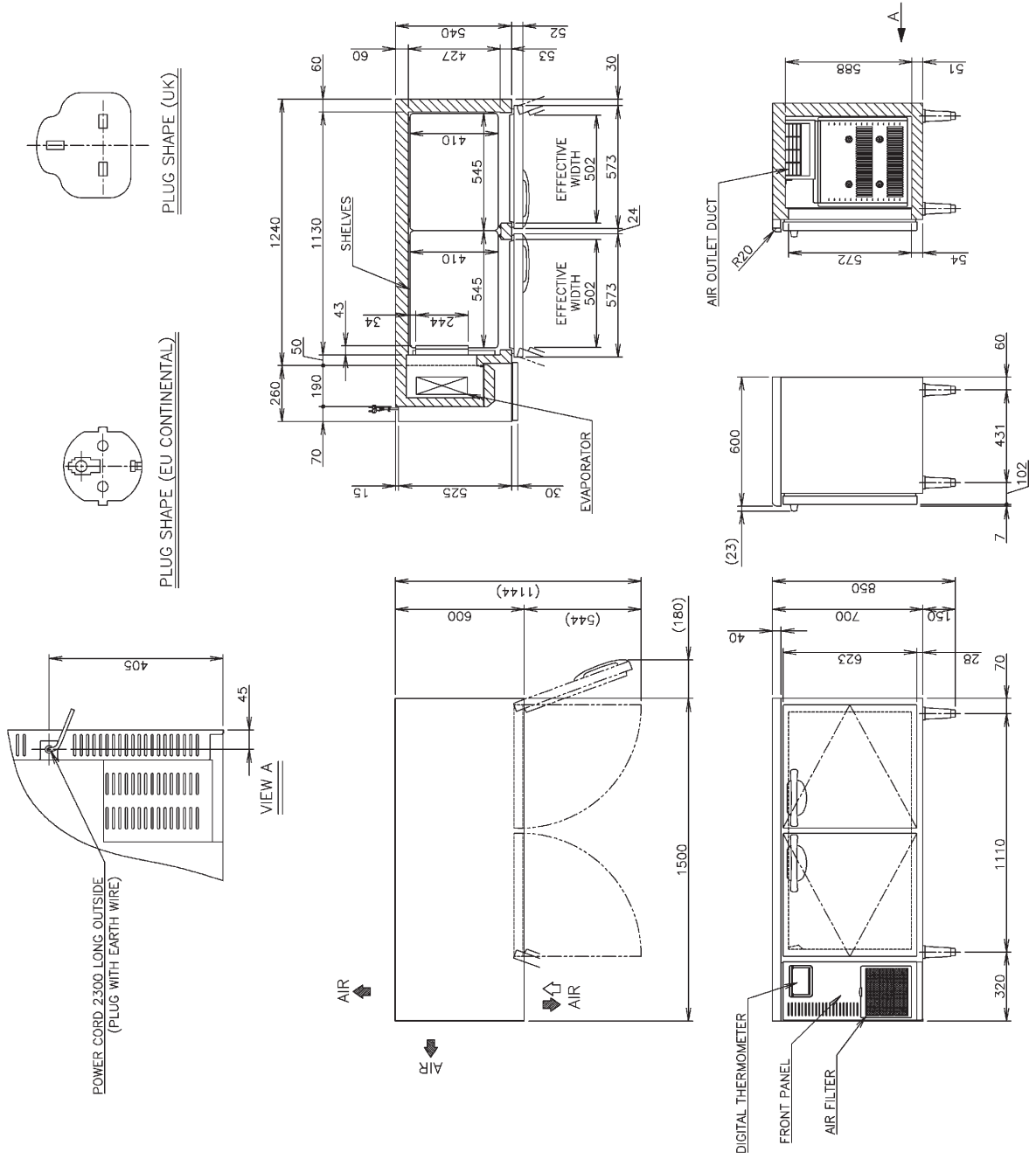


[b] RTE-150SNA

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RTE-150SNA
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.43kVA(1.9A)
AMPERAGE	Rated 1.4A Starting 6.8A
ELECTRIC CONSUMPTION	Motor 195W(Power Factor60%) Heater 186W Refrigeration 216W Defrost 193W
HEAT REJECTION	290W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	305L
OUTSIDE DIMENSIONS	W1500×D600×H850(850-880)mm
INSIDE DIMENSIONS	W1130×D427×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 110W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a/170g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 89kg (Gross: Approx. 99kg)
PACKAGE	Carton W1565×D680×H850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperature:5-43℃ Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T044 (For CONTINENTAL PLUG)
T044-D001 (For UK PLUG)

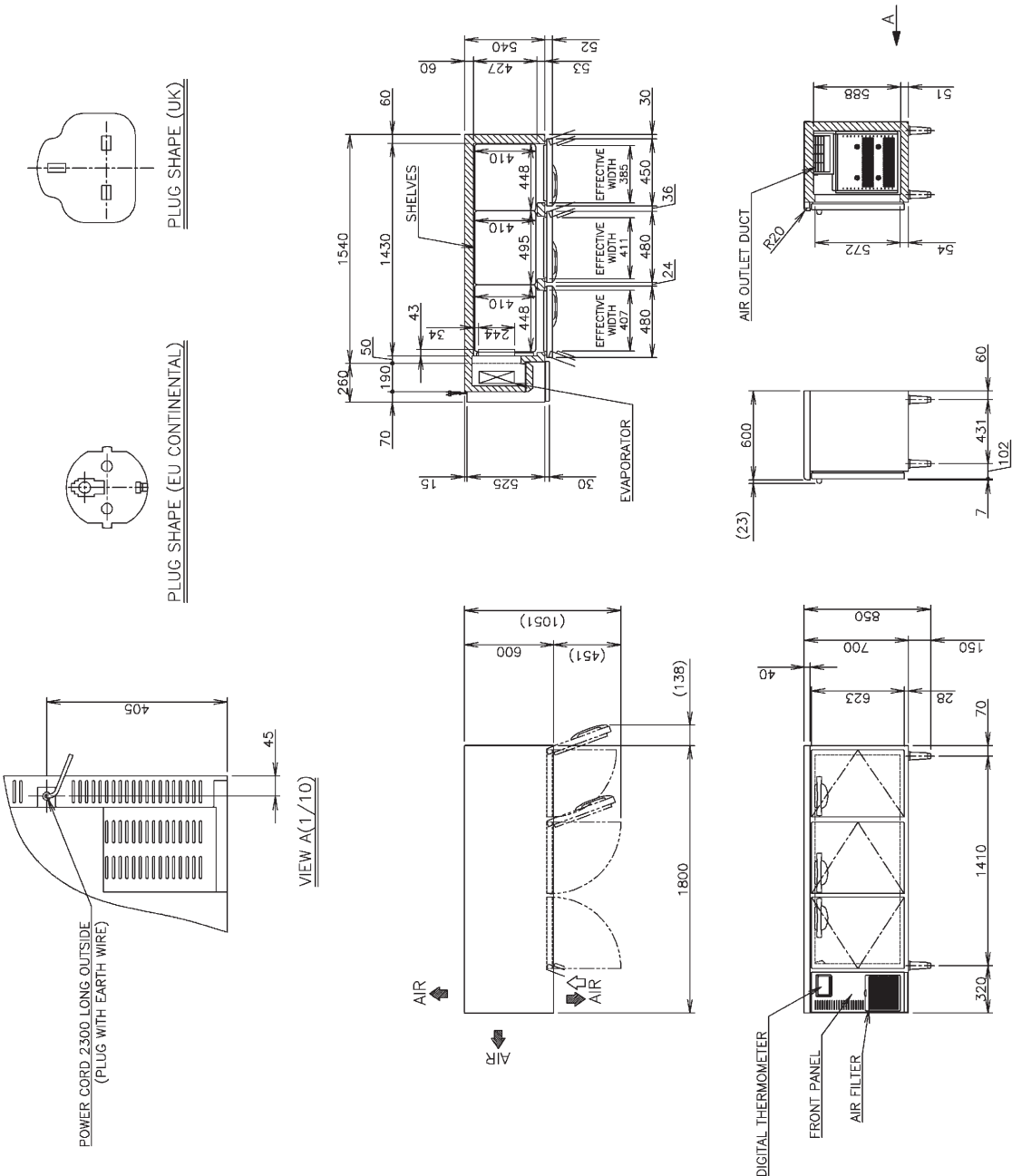


[c] RTE-180SNA

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RTE-180SNA
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.43kVA(1.9A)
AMPERAGE	Rated 1.4A Starting 6.8A
ELECTRIC CONSUMPTION	Motor 195W(Power Factor65%) Heater 194W Refrigeration 224W Defrost 201W
HEAT REJECTION	310W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	385L
OUTSIDE DIMENSIONS	W1800×D600×H850(850-880)mm
INSIDE DIMENSIONS	W1430×D427×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation Fan Motor DC12V 4W
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 110W
CONDENSER	Fin and Tube type(8 tubes high 2 rows deep) Fan Motor 7W
EVAPORATOR	Fin and Tube Type(10 tubes high 3rows deep)
REFRIGERANT	R134g/170g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net:103kg (Gross: Approx. 115kg)
PACKAGE	Carton W1865×D680×H850mm
ACCESSORIES	Shelf x 3, Shelf Clip x 12
OPERATING CONDITIONS	Ambient Temperature:-5-43℃ Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T045 (For CONTINENTAL PLUG) T045-D001 (For UK PLUG)

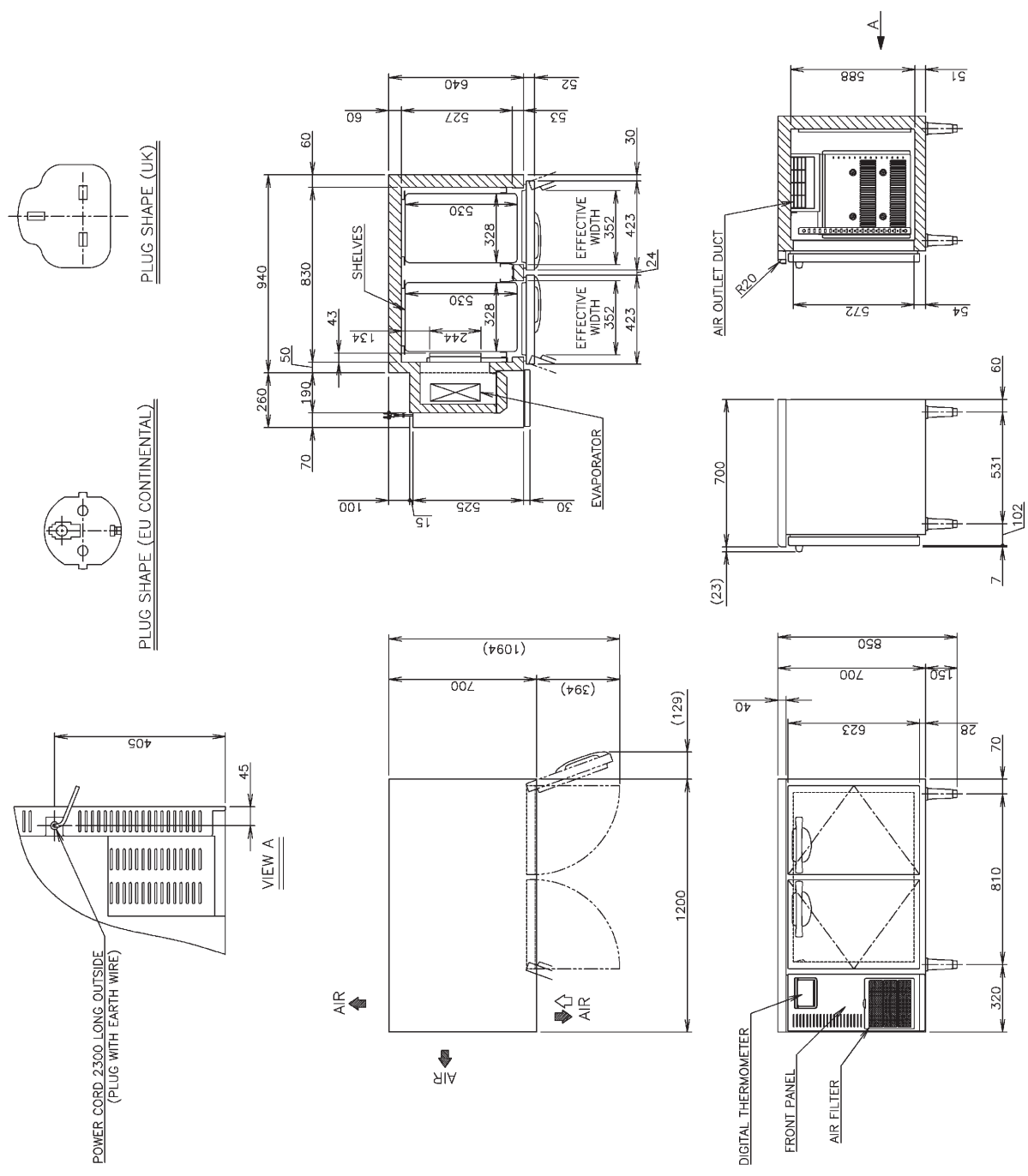


[d] RTE-120SDA-GN

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RTE-120SDA-GN
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.43kVA(1.9A)
AMPERAGE	Rated 1.4A Starting 6.8A
ELECTRIC CONSUMPTION	Motor 195W(Power Factor60%) Heater 183W Refrigeration 213W Defrost 190W
HEAT REJECTION	280W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	265L
OUTSIDE DIMENSIONS	W1200×D700×H850(850-880)mm
INSIDE DIMENSIONS	W830×D527×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 110W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a/170g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 83kg (Gross: Approx. 93kg)
PACKAGE	Carton W1265×D780×H850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperature:-5-43℃ Voltage Range:Rated Voltage±6%

We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T039 (For CONTINENTAL PLUG)
T039-D001 (For UK PLUG)

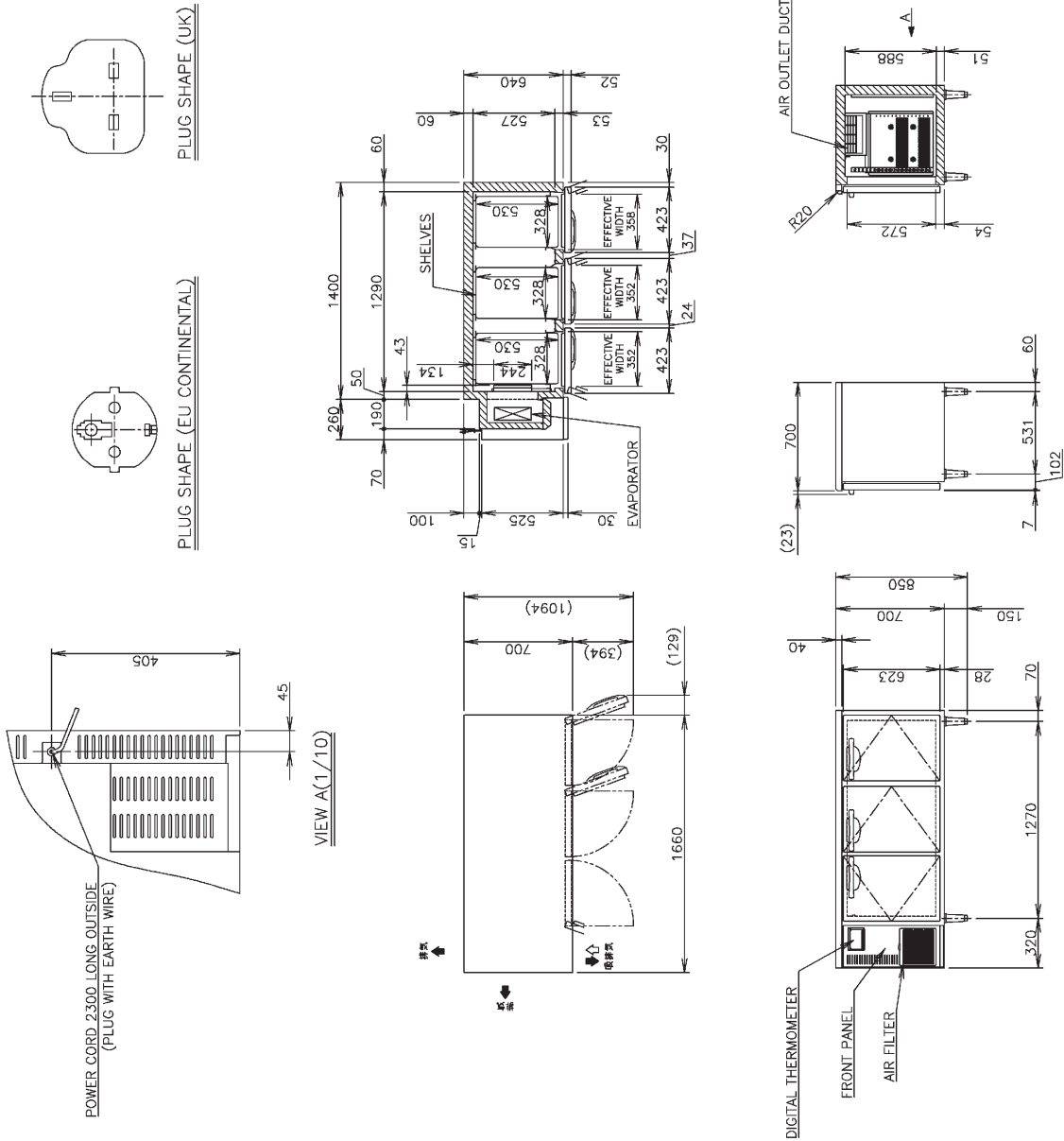


[e] RTE-170SDA-GN

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RTE-170SDA-GN
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.43kVA(1.9A)
AMPERAGE	Rated 1.4A Starting 6.8A
ELECTRIC CONSUMPTION	Motor 195W(Power Factor65%) Heater 193W Refrigeration 223W Defrost 200W
HEAT REJECTION	300W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	412L
OUTSIDE DIMENSIONS	W1660×D700×H850(850-880)mm
INSIDE DIMENSIONS	W1290×D527×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 110W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a/170g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net:103kg (Gross: Approx. 115kg)
PACKAGE	Carton W1725×D780×H850mm
ACCESSORIES	Shelf x 3, Shelf Clip x 12
OPERATING CONDITIONS	Ambient Temperature:-5-30℃ Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pull-down temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T040 (For CONTINENTAL PLUG) T040-D001 (For UK PLUG)

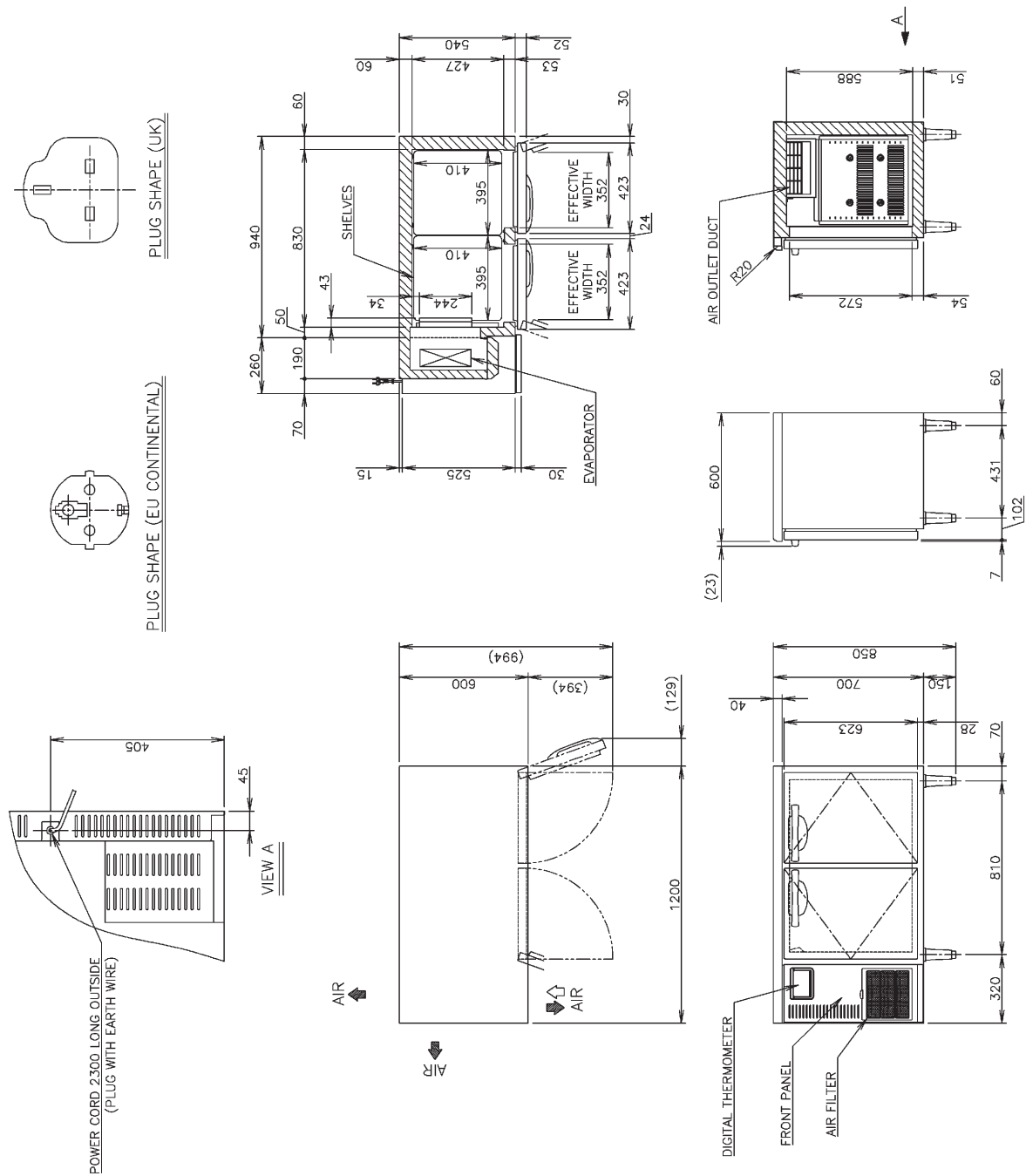


[f] FTE-120SNA

ITEM	Hoshizaki Undercounter Freezer
MODEL	FTE-120SNA
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.82kVA(3.6A)
AMPERAGE	Rated 2.8A Starting 13.0A
ELECTRIC CONSUMPTION	Motor 460W(Power Factor74%) Heater 368W Refrigeration 498W Defrost 362W
HEAT REJECTION	660W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	222L
OUTSIDE DIMENSIONS	W1200×D600×H850(850-880)mm
INSIDE DIMENSIONS	W830×D427×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 275W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -25 to -7℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 81kg (Gross: Approx. 90kg)
PACKAGE	Carton W1265×D680×H850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperature:-43℃ Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -25 to -7℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T046 (For CONTINENTAL PLUG)
T046-B001 (For UK PLUG)

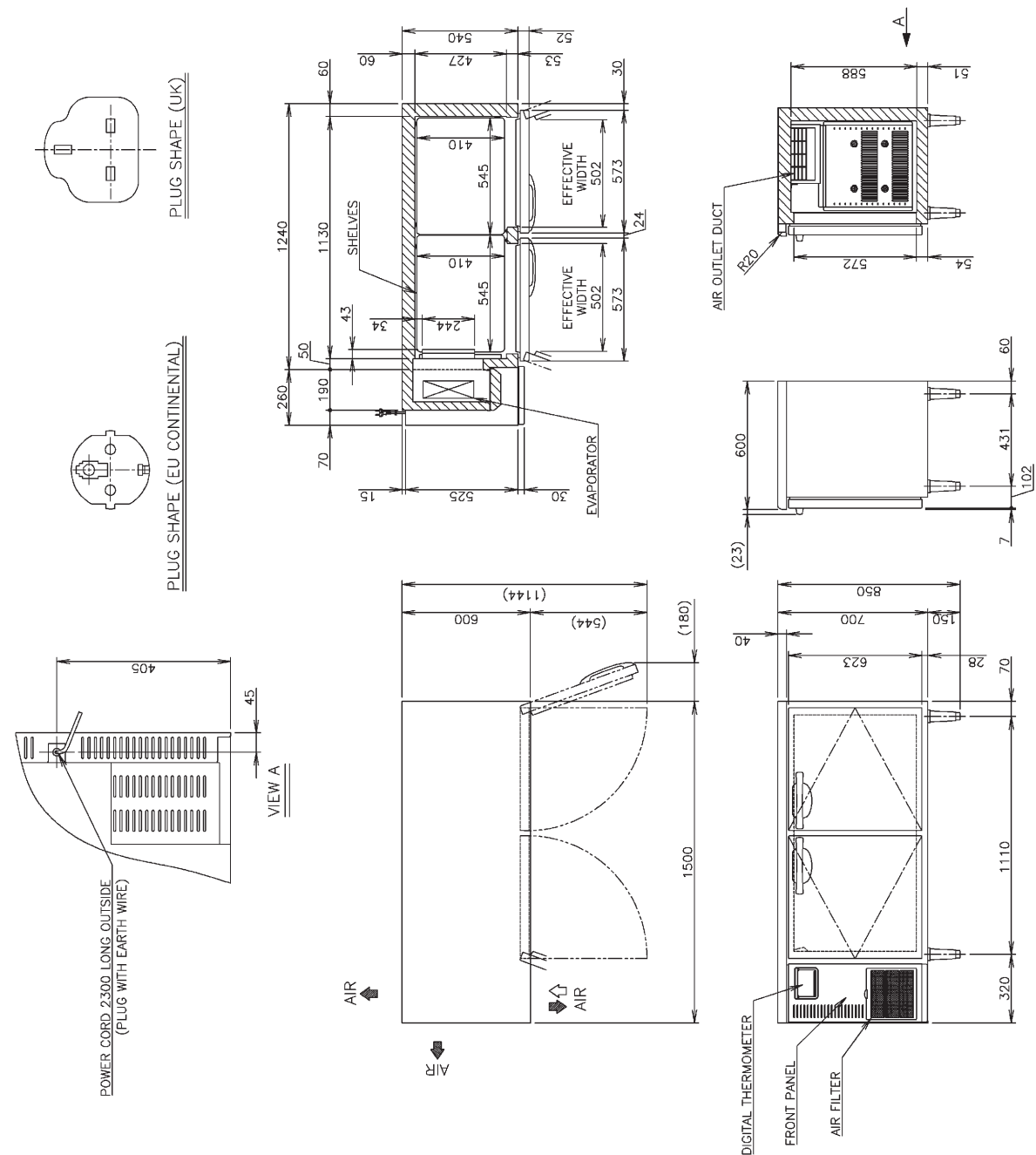


[g] FTE-150SNA

ITEM	Hoshizaki Undercounter Freezer
MODEL	FTE-150SNA
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.82kVA(3.6A)
AMPERAGE	Rated 2.8A Starting 13.0A
ELECTRIC CONSUMPTION	Motor 460W(Power Factor74%) Heater 373W Refrigeration 503W Defrost 367W
HEAT REJECTION	660W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	305L
OUTSIDE DIMENSIONS	W1500×D600×H850(850-880)mm
INSIDE DIMENSIONS	W1130×D427×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 275W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -25 to -7℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 92kg (Gross: Approx. 102kg)
PACKAGE	Carton W1565×D680×H850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperatures-43℃ Voltage Range:Rated Voltage±6%

We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -25 to -7℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T047 (For CONTINENTAL PLUG)
T047-D001 (For UK PLUG)

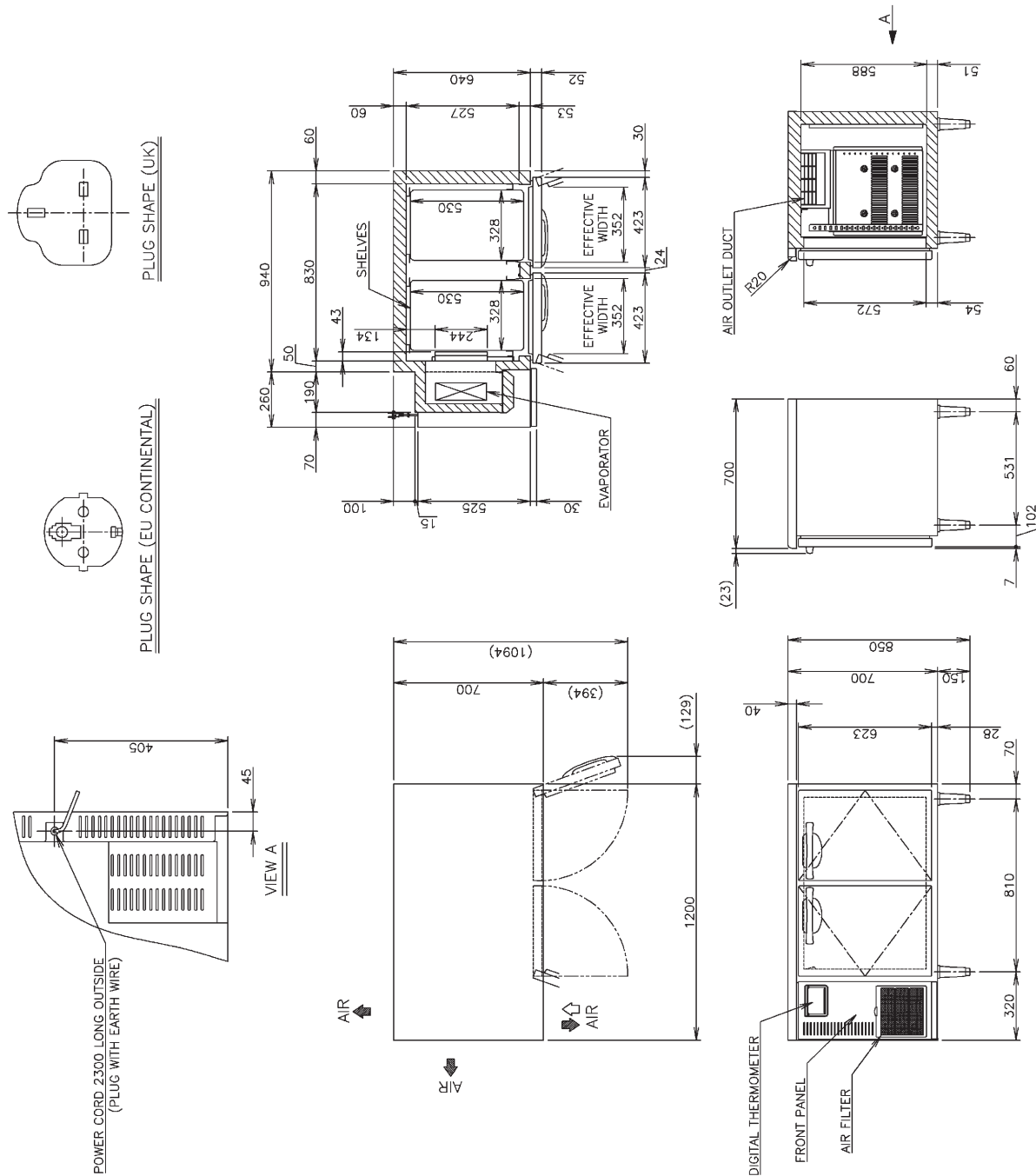


[i] FTE-120SDA-GN

ITEM	Hoshizaki Undercounter Freezer
MODEL	FTE-120SDA-GN
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.82kVA(3.6A)
AMPERAGE	Rated 2.8A Starting 13.0A
ELECTRIC CONSUMPTION	Motor 460W(Power Factor74%) Heater 368W Refrigeration 498W Defrost 362W
HEAT REJECTION	660W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	265L
OUTSIDE DIMENSIONS	W1200xD700xH850(850-880)mm
INSIDE DIMENSIONS	W830xD527xH588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 275W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A/200g
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -25 to -7℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net: 87kg (Gross: Approx. 97kg)
PACKAGE	Carton W1265xD780xH850mm
ACCESSORIES	Shelf x 2, Shelf Clip x 8
OPERATING CONDITIONS	Ambient Temperature:-30 Voltage Range:Rated Voltage±6%

We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pull-down temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The ampereage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -25 to -7℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T041 (For CONTINENTAL PLUG)
T041-D001 (For UK PLUG)

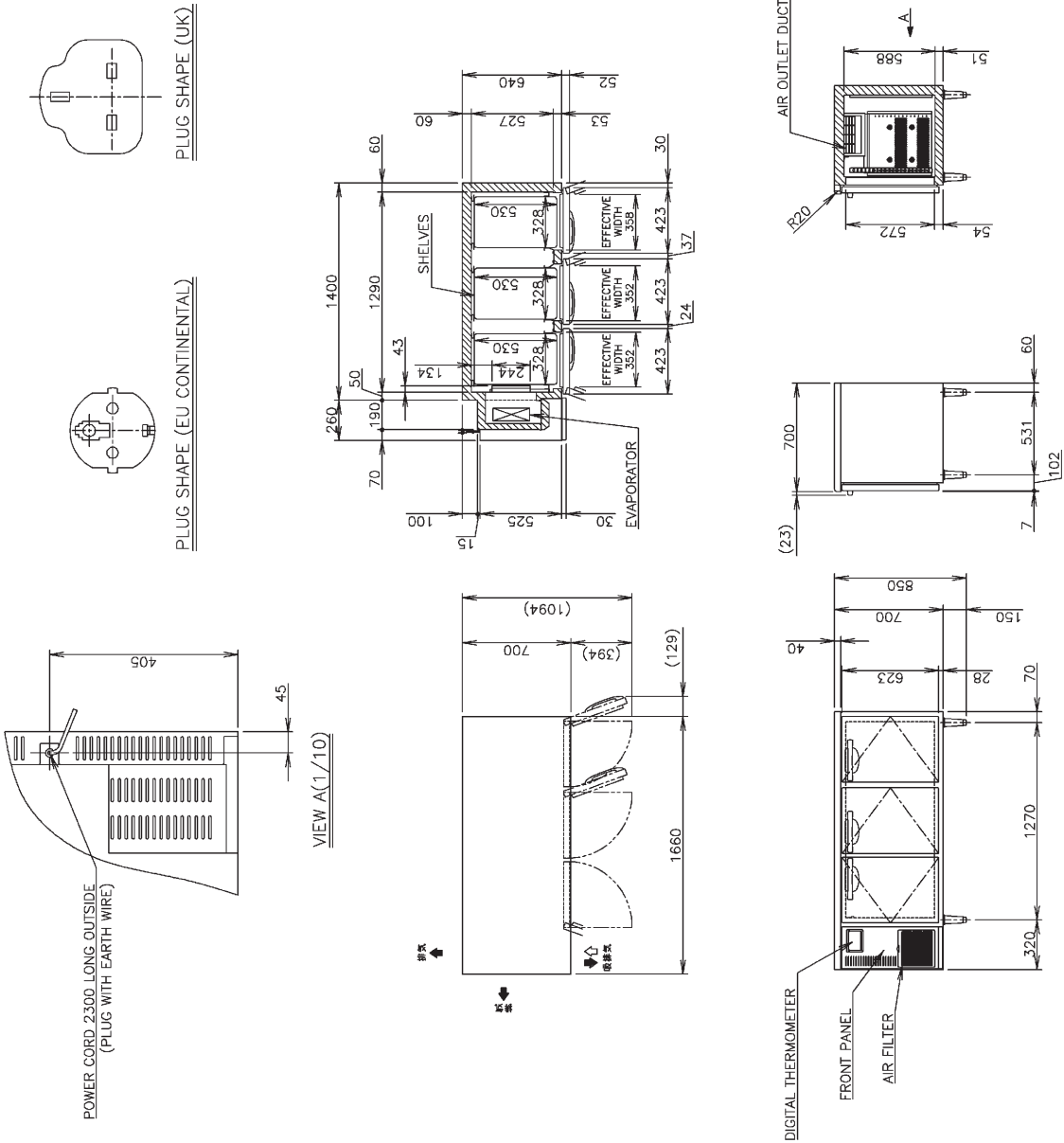


[J] FTE-170SDA-GN

ITEM	Hoshizaki Undercounter Freezer
MODEL	FTE-170SDA-GN
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.95kVA(4.1A)
AMPERAGE	Rated 3.4A Starting 14.8A
ELECTRIC CONSUMPTION	Motor 510W(Power Factor69%) Heater 389W Refrigeration 569W Defrost 384W
HEAT REJECTION	900W
POWER CORD	2.3m (Plug with Earth Wire)
EFFECTIVE CAPACITY	412L
OUTSIDE DIMENSIONS	W1660×D700×H850(850-880)mm
INSIDE DIMENSIONS	W1290×D527×H588mm
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom)
INTERIOR	Stainless Steel, ABS Plastic
INSULATION	Polyurethane Foam
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic 385W
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -25 to -7℃
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	10A Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable from 150 to 180mm
WEIGHT	Net:109kg (Gross: Approx. 121kg)
PACKAGE	Carton W1725×D780×H850mm
ACCESSORIES	Shelf x 3, Shelf Clip x 12
OPERATING CONDITIONS	Ambient Temperatures:-5-43℃ Voltage Range:Rated Voltage±6%

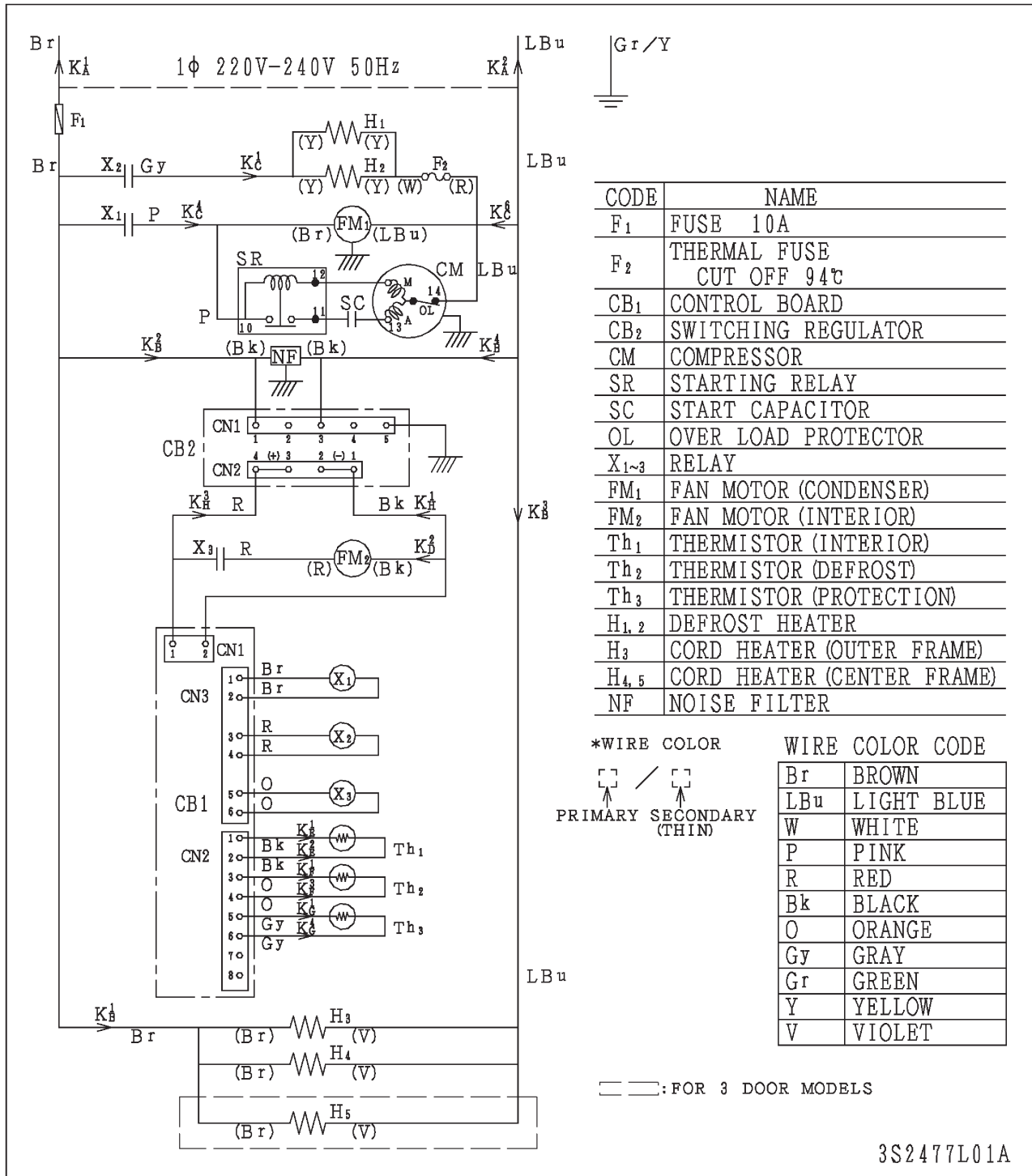
*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 43℃ and power supply of 230V 50Hz.
The amperage and electric consumption are based on measurements at ambient temperature of 43℃ and power supply of 230V 50Hz.
3. The cabinet temperature range of -25 to -7℃ is guaranteed at ambient temperature of 30℃.
4. Product Code : T042 (For CONTINENTAL PLUG)
T042-D001 (For UK PLUG)



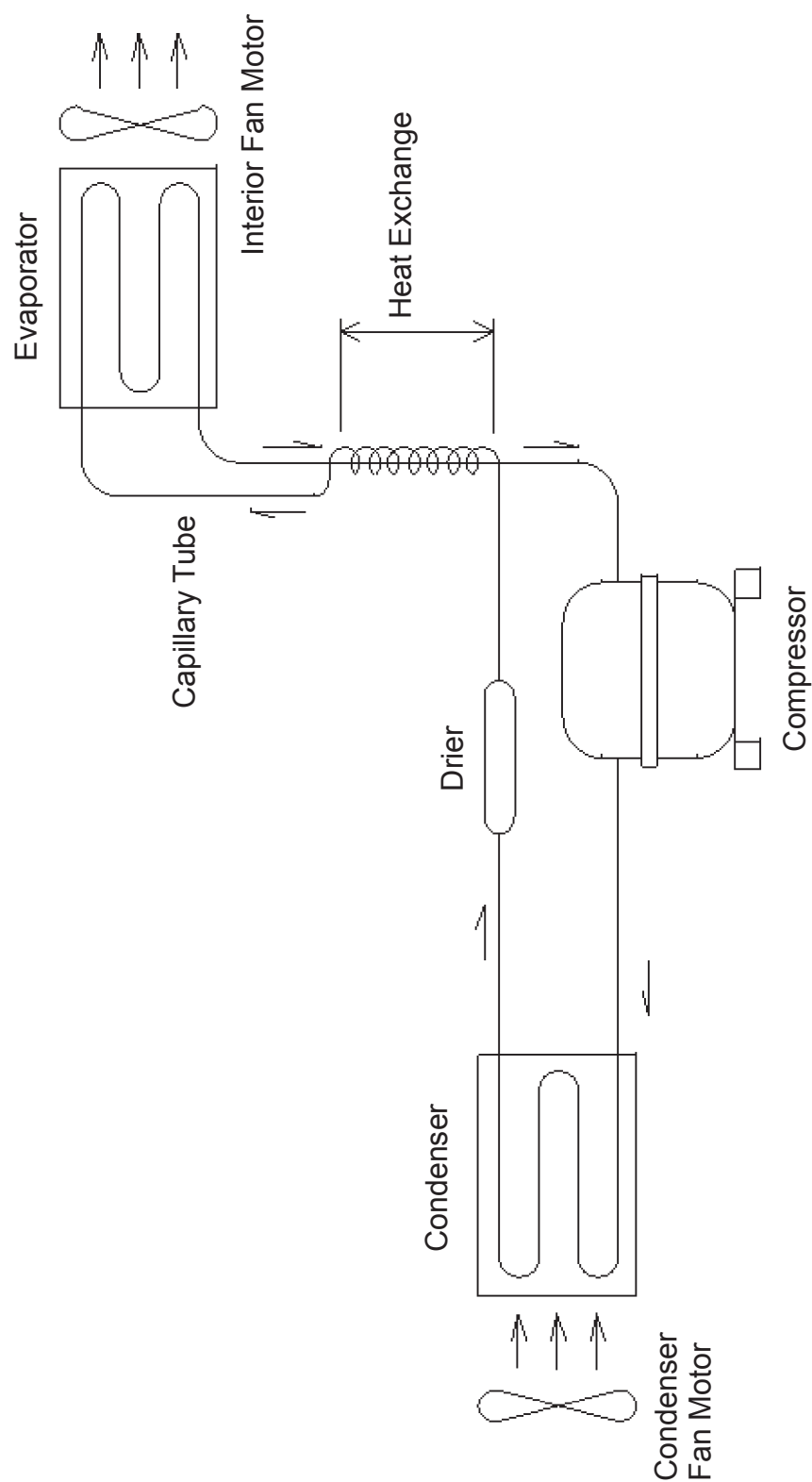
[a] RTE SERIES

[b] FTE SERIES



3S2477L01A

2. REFRIGERATION CIRCUIT



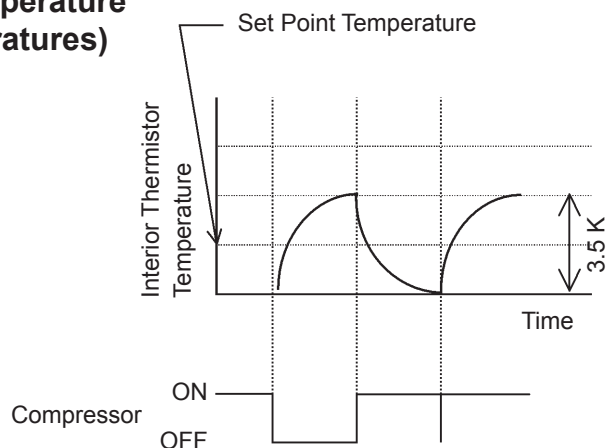
Refrigerant:	HFC-134a (RTE series) HFC-404A (FTE series)
--------------	--

3. ELECTRONIC CONTROLS

[a] SET POINT TEMPERATURE (mean temperature between compressor ON and OFF temperatures)

RTE series: -6 to +12°C

FTE series: -25 to -7°C



[b] CABINET TEMPERATURE DIFFERENTIAL

3.5 K OFF temperature = Set point temp - 2.0 K
ON temperature = Set point temp + 1.5 K

Note: On the Controller Board only. Actual differential may be larger.

[c] DEFROST CYCLE

Every 6 hours

Note: During a defrost cycle, the Temperature Display Window indicates “dF”. See “6. TIMING CHART” for further details.

[d] DEFROST COMPLETION TEMPERATURE

RTE series: 15°C

FTE series: 5°C

[e] CLOGGED CONDENSER DETECTION TEMPERATURE

RTE series: 58°C for 2 minutes

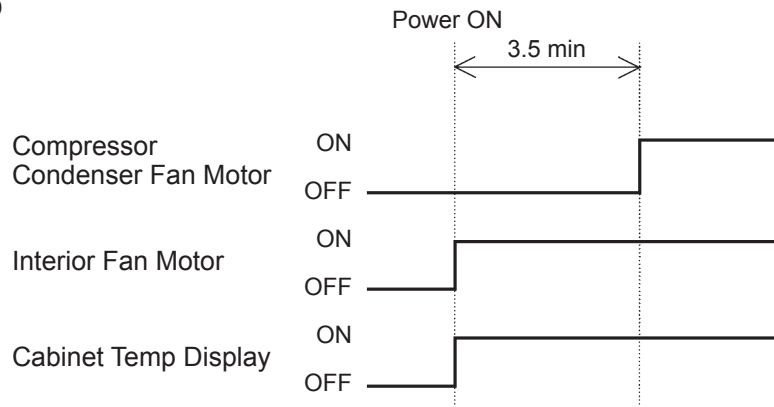
FTE series: 58°C for 2 minutes

[f] TEMPERATURE DISPLAY CYCLE

The Temperature Display Window renews its cabinet temperature display every 30 seconds. The display remains the same for 30 seconds even if the actual temperature changes in the meantime. During a defrost cycle, the Temperature Display Window indicates “dF”.

[g] COMPRESSOR SOFT START

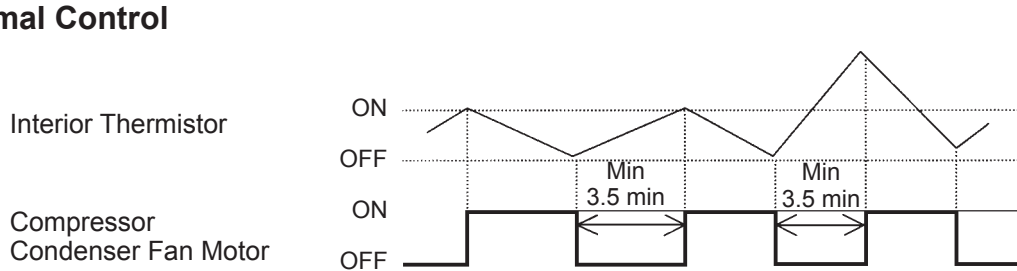
1) Startup



When the power supply is turned on, the Interior Fan Motor starts up and the Temperature Display Window shows the cabinet temperature, but the Compressor and Condenser Fan Motor start up with a 3.5 minute delay.

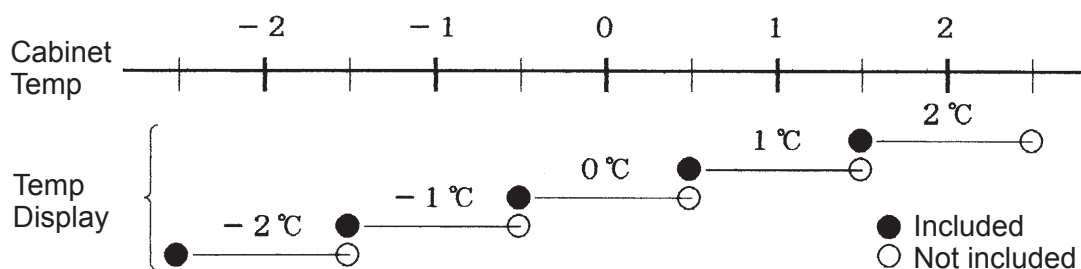
This delay is intended to minimize the difference between the high-side and low-side pressures and to reduce the load on the Compressor so that it can start easily in case of a short (especially instantaneous) power failure.

2) Normal Control



When the Compressor turns off during normal control, it has a mandatory 3.5 minute delay before startup. For example, if the Compressor turns off by its Thermistor and the Door is opened immediately after (causing the cabinet temperature to immediately exceed the restart temperature), the Compressor will still not start until 3.5 minutes have passed since its shutdown.

[h] CABINET TEMPERATURE AND TEMPERATURE DISPLAY



[i] RESOLUTION

0.5 K (1 K for temperature setting and display)

[j] SET POINT TEMPERATURE AND CABINET TEMPERATURE

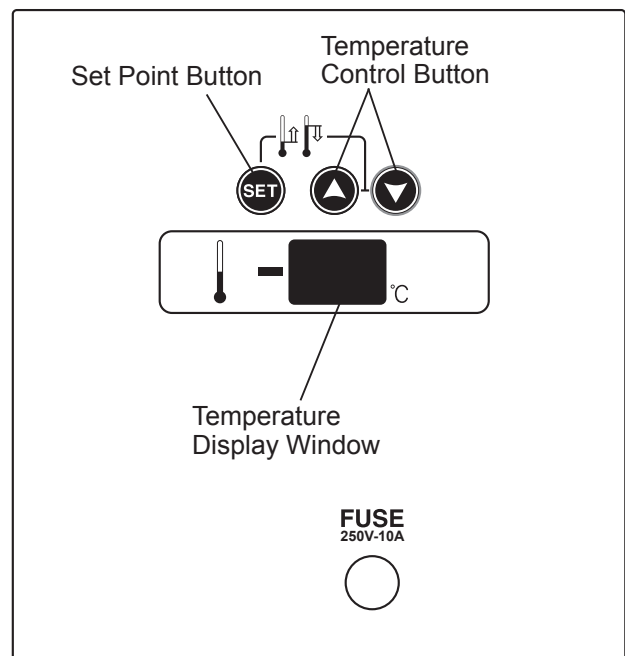
(Compressor OFF temperature / Compressor ON temperature)

Refrigerator (RTE series)	Set Point Temp (°C)	12	11	10	9	8	7
	Cabinet Temp (°C)	10/13	9/12	8/11	7/10	6/9	5/8
	Set Point Temp (°C)	6	5	4	3	2	1
	Cabinet Temp (°C)	4/7	3/6	2/5	1/4	0/3	-1/2
	Set Point Temp (°C)	0	-1	-2	-3	-4	-5
	Cabinet Temp (°C)	-2/1	-3/0	-4/-1	-5/-2	-6/-3	-7/-4
	Set Point Temp (°C)	-6					
	Cabinet Temp (°C)	-8/-5					
Freezer (FTE series)	Set Point Temp (°C)	-7	-8	-9	-10	-11	-12
	Cabinet Temp (°C)	-9/-6	-10/-7	-11/-8	-12/-9	-13/-10	-14/-11
	Set Point Temp (°C)	-13	-14	-15	-16	-17	-18
	Cabinet Temp (°C)	-15/-12	-16/-13	-17/-14	-18/-15	-19/-16	-20/-17
	Set Point Temp (°C)	-19	-20	-21	-22	-23	-24
	Cabinet Temp (°C)	-21/-18	-22/-19	-23/-20	-24/-21	-25/-22	-26/-23
	Set Point Temp (°C)	-25					
	Cabinet Temp (°C)	-27/-24					

[k] CHECKING AND ADJUSTING SET POINT TEMPERATURE

Press the Set Point Button to display the set point temperature on the Temperature Display Window. To change the set point temperature, hold down the Set Point Button and press the Temperature Control Button.

The set point temperature cannot be memorized until 10 seconds have passed since its adjustment. That is, if the power supply is turned off within 10 seconds after adjustment, the set point temperature will remain the same as before when the power supply is turned back on.



[I] MANUAL DEFROST

When the two Temperature Control Buttons are pressed at the same time for 3 seconds, the refrigerator/freezer will start a manual defrost cycle. The refrigerator/freezer will start repeating automatic defrost cycles 6 hours after the Temperature Control Buttons are pressed.

Note: The refrigerator/freezer will not start a manual defrost cycle if the Defrost Thermistor senses a temperature of 15°C or more (RTE series) or 5°C or more (FTE series).

[m] CANCELING SOFT START

To cancel the “Soft Start” (3.5 minute delay), turn on the power supply while pressing the Set Point Button. The Compressor and Condenser Fan Motor will start at the same time after the Temperature Display Window shows the data code for 0.5 second.

Data code: RTE series A5
FTE series B5

4. ERROR CODES

In case of trouble, the Temperature Display Window will alternately flash every second between one of the following error codes and the cabinet temperature or “dF” during a defrost cycle. The error codes are displayed in the following order of priority:

Priority	Code	Error
1	ED	EEPROM Verify Error
2	EA	EEPROM Write Error
3	E8	Defrost Thermistor Defective
4	E9	Clog Thermistor Defective
5	E4	Abnormal Pressure
6	E7	Condenser Clogged
7	E3	Defrost Cycle Too Long
8	E1	Cabinet Temperature Too High
9	E2	Cabinet Temperature Too Low

[a] EEPROM WRITE ERROR (EA)

When the values written on EEPROM (IC3) differ from those retrieved for verification, “EA” will be displayed.

The “EA” display will not reset until the power supply is turned off.

The EEPROM (IC3) may be defective. Replace the Controller Board.

[b] EEPROM VERIFY ERROR (ED)

When every value retrieved from EEPROM (IC3) for verification differs from the memory setting of the Controller Board, "ED" will be displayed.

The "ED" display will automatically reset when retrieved values have been verified.

The EEPROM (IC3) may be defective. Replace the Controller Board.

[c] CABINET TEMPERATURE TOO HIGH (E1)

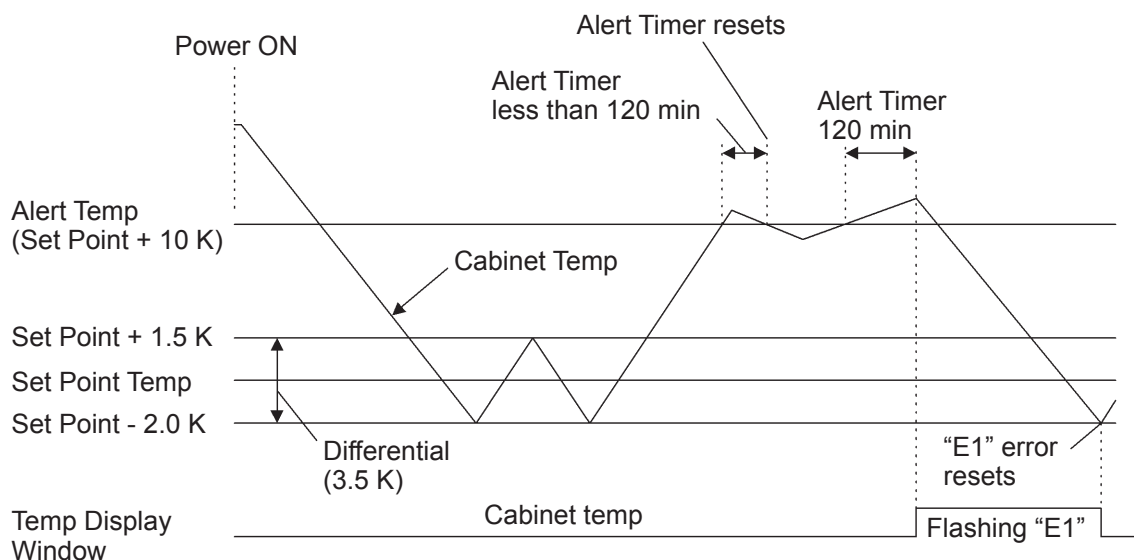
When the cabinet temperature rises to the alert temperature (10 K above the set point), the High Temperature Alert Timer will start counting down from 120 minutes. When the Timer counts down to zero, "E1" will be displayed. If the cabinet temperature drops below the alert temperature before the Timer counts down to zero, the Timer will reset and "E1" will not be displayed.

When the power supply is turned on, this function will not work until the cabinet temperature drops below the Compressor OFF temperature. This function is available even during a defrost cycle.

The "E1" display will automatically reset when the cabinet temperature drops below the Compressor OFF temperature.

The cause may be:

- 1) The Doors are opened too frequently or left open.
- 2) The Interior Thermistor (black) is defective.
- 3) The Compressor is defective or gas is leaking.



[d] CABINET TEMPERATURE TOO LOW (E2)

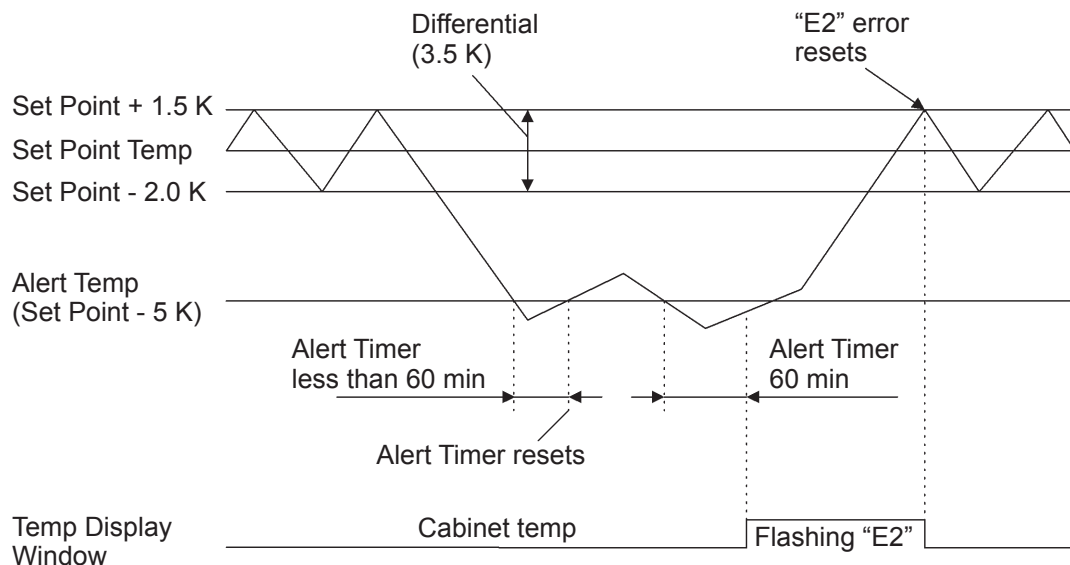
When the cabinet temperature drops to the alert temperature (5 K below the set point), the Low Temperature Alert Timer will start counting down from 60 minutes. When the Timer counts down to zero, “E2” will be displayed. If the cabinet temperature rises above the alert temperature before the Timer counts down to zero, the Timer will reset and “E2” will not be displayed.

When the power supply is turned on, the Timer will start counting if the cabinet temperature is below the alert temperature (5 K below the set point). This function is available even during a defrost cycle.

The “E2” display will automatically reset when the cabinet temperature rises above the Compressor ON temperature.

The cause may be:

- 1) The ambient temperature is too low, or a large amount of frozen food is stored inside.
- 2) The Interior Thermistor (black) is defective.



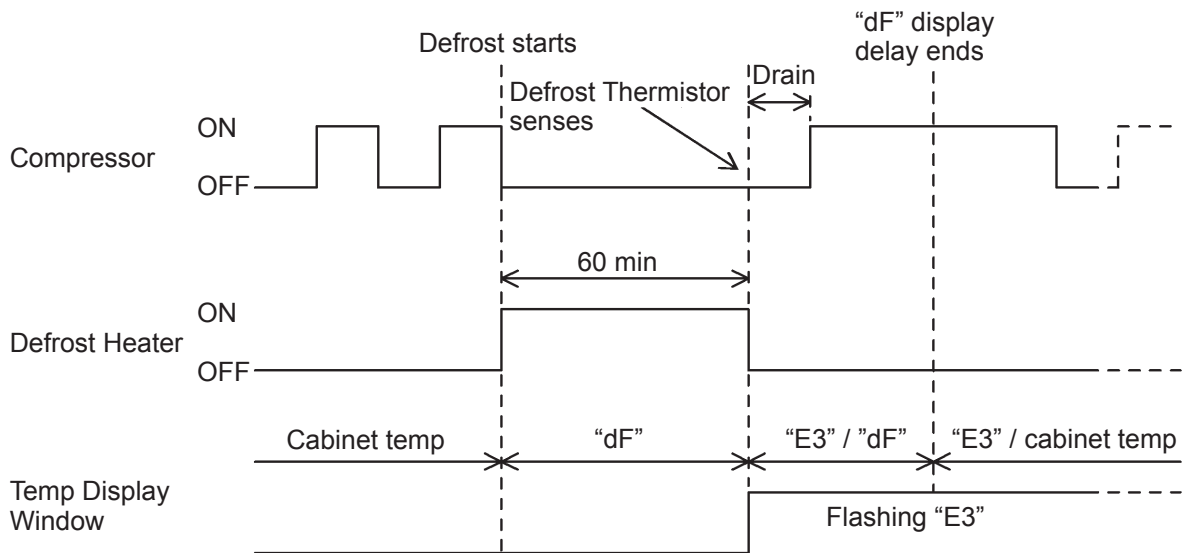
[e] DEFROST CYCLE TOO LONG (E3)

When the Defrost Thermistor does not turn off after 60 minutes have passed since the defrost cycle starts, “E3” will be displayed. In this case, the refrigerator/freezer will proceed to the next process: (1) Defrost cycle terminated, (2) Drain, (3) Fan Motor delay, (4) “dF” display delay, (5) Cooling cycle.

The “E3” display will not reset until the power supply is turned off.

The cause may be:

- 1) The Defrost Heater is defective.
- 2) The Thermal Fuse is brown.
- 3) The Defrost Thermistor (orange) is defective.
- 4) A large amount of moist food is stored inside.



[f] ABNORMAL PRESSURE (E4)

When the Clog Thermistor senses a temperature above 70°C (RTE series) or 65°C (FTE series), the refrigerator/freezer will detect an abnormal pressure to stop the Compressor for 5 minutes. At the first detection, the Pressure Alert Timer will start counting down from 60 minutes.

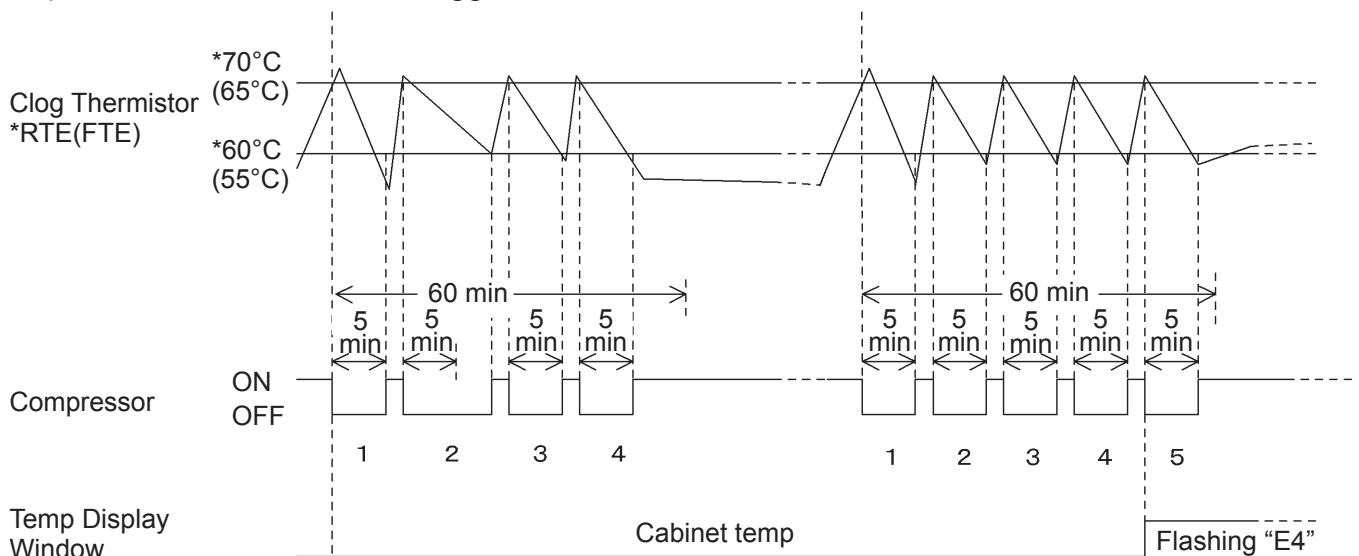
The Compressor will restart after the 5 minute interruption, if the Clog Thermistor senses a temperature below 60°C (RTE series) or 55°C (FTE series). The Compressor will not restart until the above conditions are satisfied. If an abnormal pressure is still detected, the Compressor will stop again.

If an abnormal pressure is detected five times before the Timer counts down to zero, "E4" will be displayed. If the Timer has already counted down by then, "E4" will not be displayed. This function is available even during a defrost cycle.

The "E4" display will not reset until the power supply is turned off.

The cause may be:

- 1) The Condenser Fan Motor is locked or defective.
- 2) The Condenser Filter is clogged with dirt or dust.



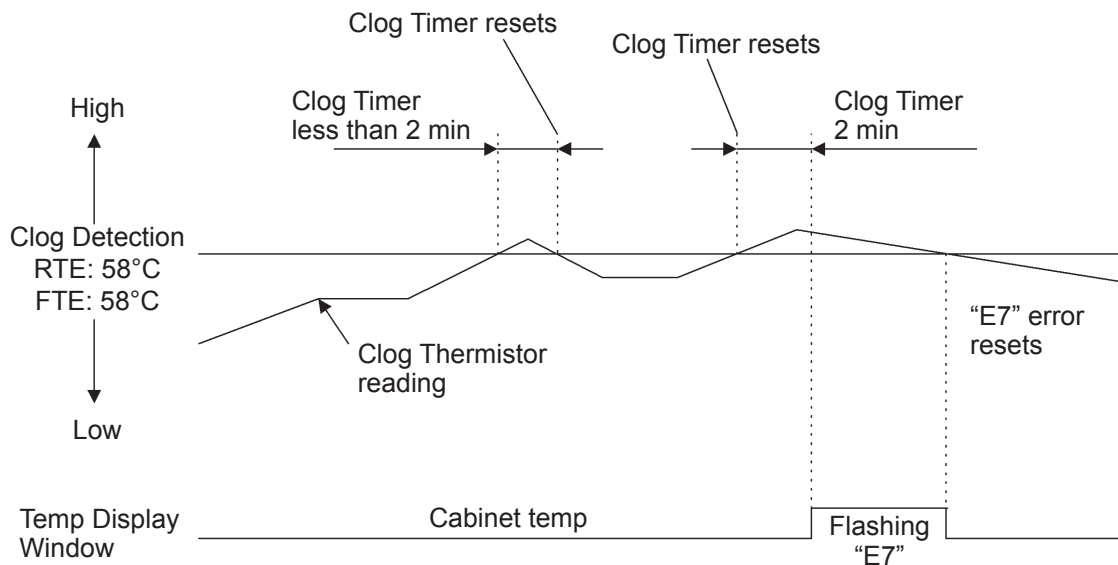
[g] CONDENSER CLOGGED (E7)

When the Clog Thermistor senses a temperature above 58°C (RTE series) or 58°C (FTE series) for 2 minutes, “E7” will be displayed.

The “E7” display will automatically reset when the Clog Thermistor senses a temperature below the above point.

The cause may be:

- 1) The Condenser Fan Motor is locked or defective.
- 2) The Condenser Filter is clogged with dirt or dust.



[h] DEFROST THERMISTOR DEFECTIVE (E8)

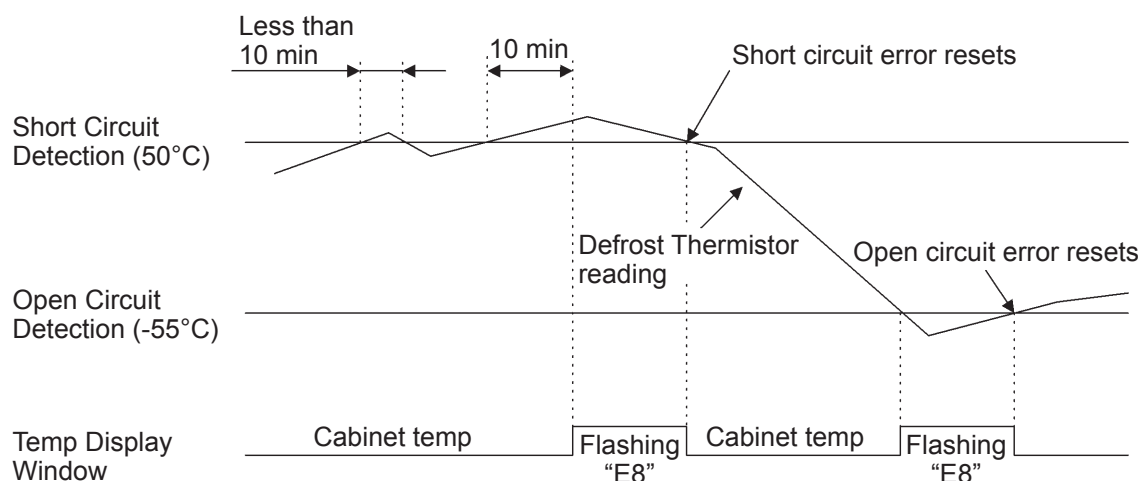
When the Defrost Thermistor senses a temperature below -55°C (open circuit) or above 50°C for 10 minutes (short circuit), “E8” will be displayed. A short circuit will not be detected for 1 hour after the power supply is turned on. When the power supply is turned on with the Set Point Button pressed (to cancel soft start), a short circuit will be detectable immediately after startup.

This function is not available during a defrost, drain or Fan Motor delay process.

In case of an open circuit, the “E8” display will automatically reset when the temperature rises above -55°C. In case of a short circuit, the “E8” display will automatically reset when the temperature drops below 50°C.

The cause may be:

- 1) The Defrost Thermistor (orange) is defective.



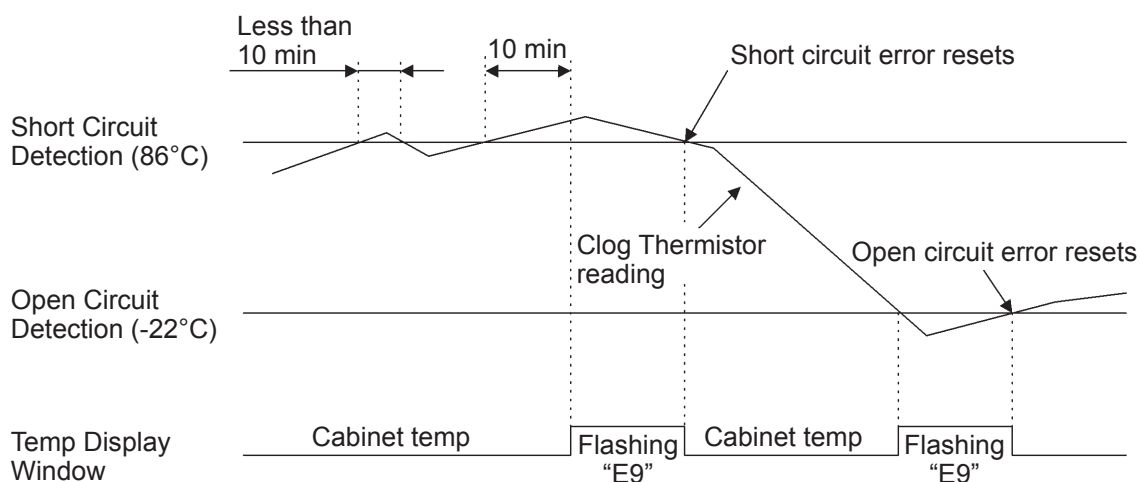
[i] CLOG THERMISTOR DEFECTIVE (E9)

When the Clog Thermistor senses a temperature below -22°C (open circuit) or above 86°C (short circuit), "E9" will be displayed. When the power supply is turned on with the Set Point Button pressed (to cancel soft start), a short circuit will be detectable immediately after startup.

In case of an open circuit, the "E9" display will automatically reset when the temperature rises above -22°C. In case of a short circuit, the "E9" display will automatically reset when the temperature drops below 86°C.

The cause may be:

- 1) The Clog Thermistor (gray) is defective.



5. ENERGY SAVING CONTROL

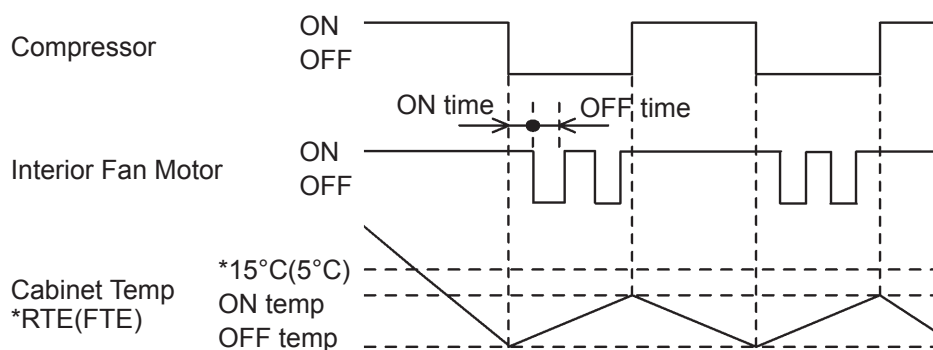
[a] STANDARD MODE

To quickly refrigerate stored items, select the standard mode by pressing and holding the downward Temperature Control Button "▼" for 5 seconds. The decimal point disappears from the Temperature Display Window, and the Interior Fan Motor runs continuously. To

resume the energy saving control, press and hold the downward Temperature Control Button “▼” again for 5 seconds. The decimal point reappears on the Temperature Display Window.

[b] ENERGY SAVING MODE

The refrigerator/freezer is under energy saving control while the Temperature Display Window indicates a decimal point. While the cabinet temperature is rising in control operation, the Interior Fan Motor operates intermittently.



Interior Fan Motor ON/OFF Time

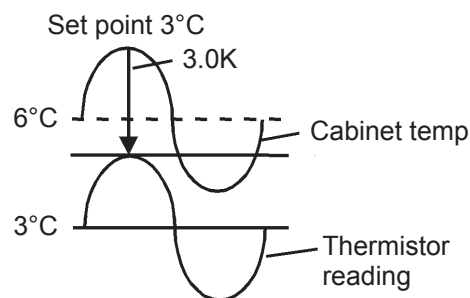
Model	Cabinet Temp Setting	ON Time	OFF Time
RTE	0 to 12°C	15 sec	150 sec
	-6 to -1°C	15 sec	90 sec
FTE	N/A	30 sec	30 sec

[c] CABINET TEMPERATURE CORRECTION

Any difference between the actual cabinet center temperature and the displayed temperature (Thermistor reading) can be corrected within -5.0 to 5.0 K in 0.5 K steps.

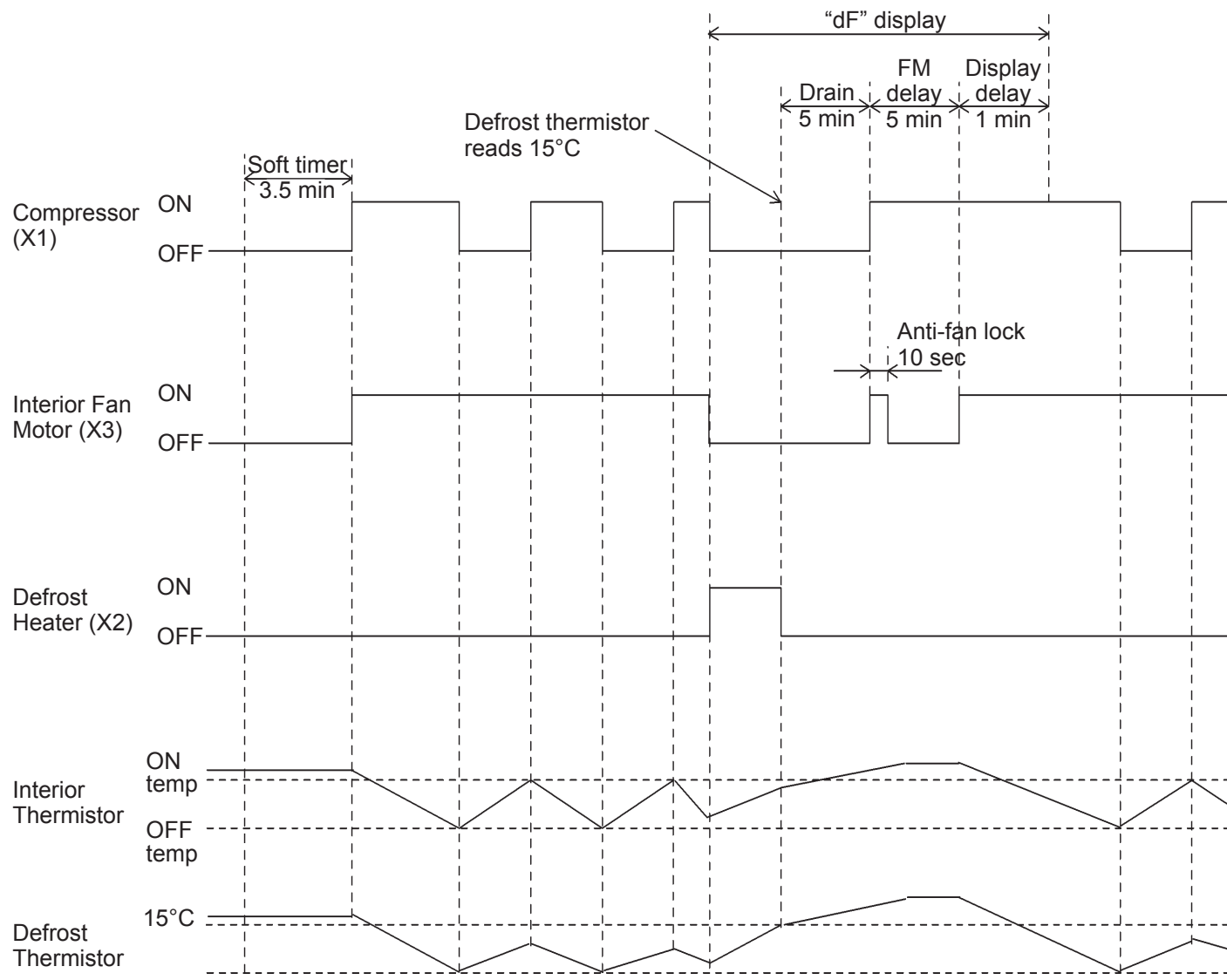
- 1) Turn on the power supply while pressing and holding the upward Temperature Control Button “▲”. The cabinet temperature correction mode becomes available, and the current offset appears on the Temperature Display Window (e.g. “10” stands for 1.0 K).
- 2) To correct the offset, press the Temperature Control Button. To store the offset, press the Set Point Button. The Temperature Display Window goes off for a moment.
- 3) Turn off the power supply and turn it back on. The cooling cycle begins with the corrected offset.

For example, as shown on the right, if the average cabinet temperature is 3 K higher than the Thermistor reading, set the offset to 3.0 K (standard setting: 1.0 K). The cabinet temperature will be controlled at 3°C.

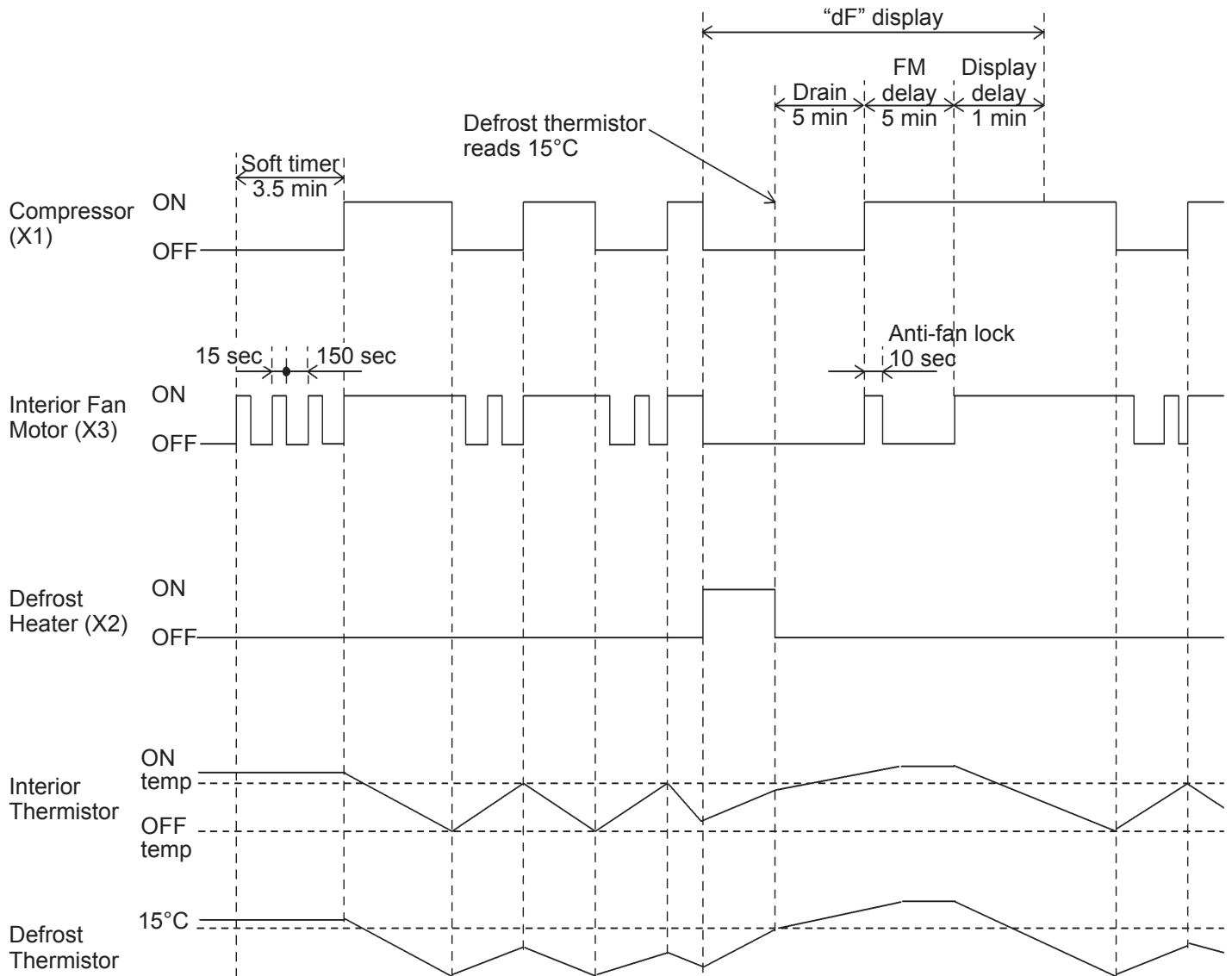


6. TIMING CHART

[a] STANDARD MODE (RTE series)

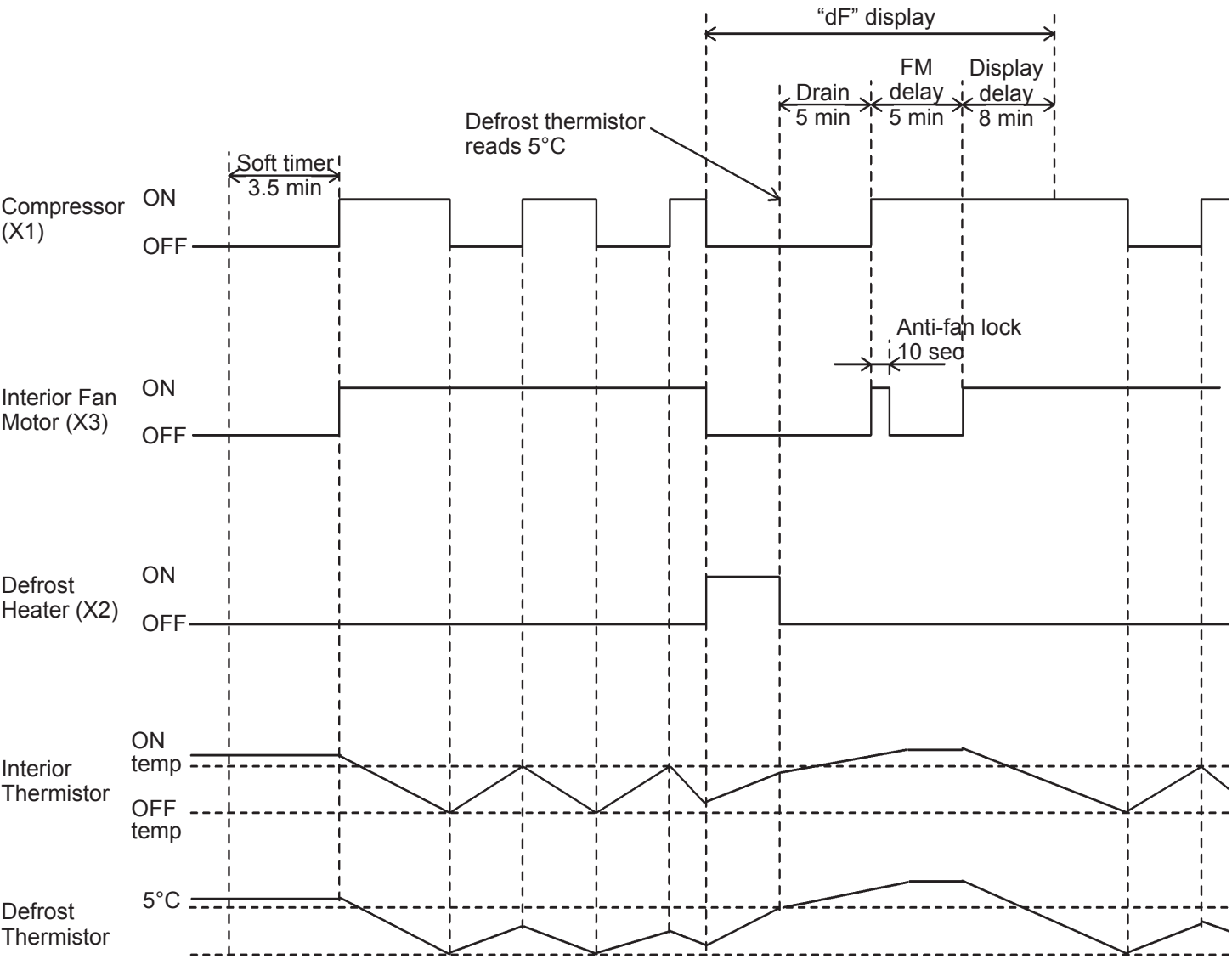


[b] ENERGY SAVING MODE (RTE series)

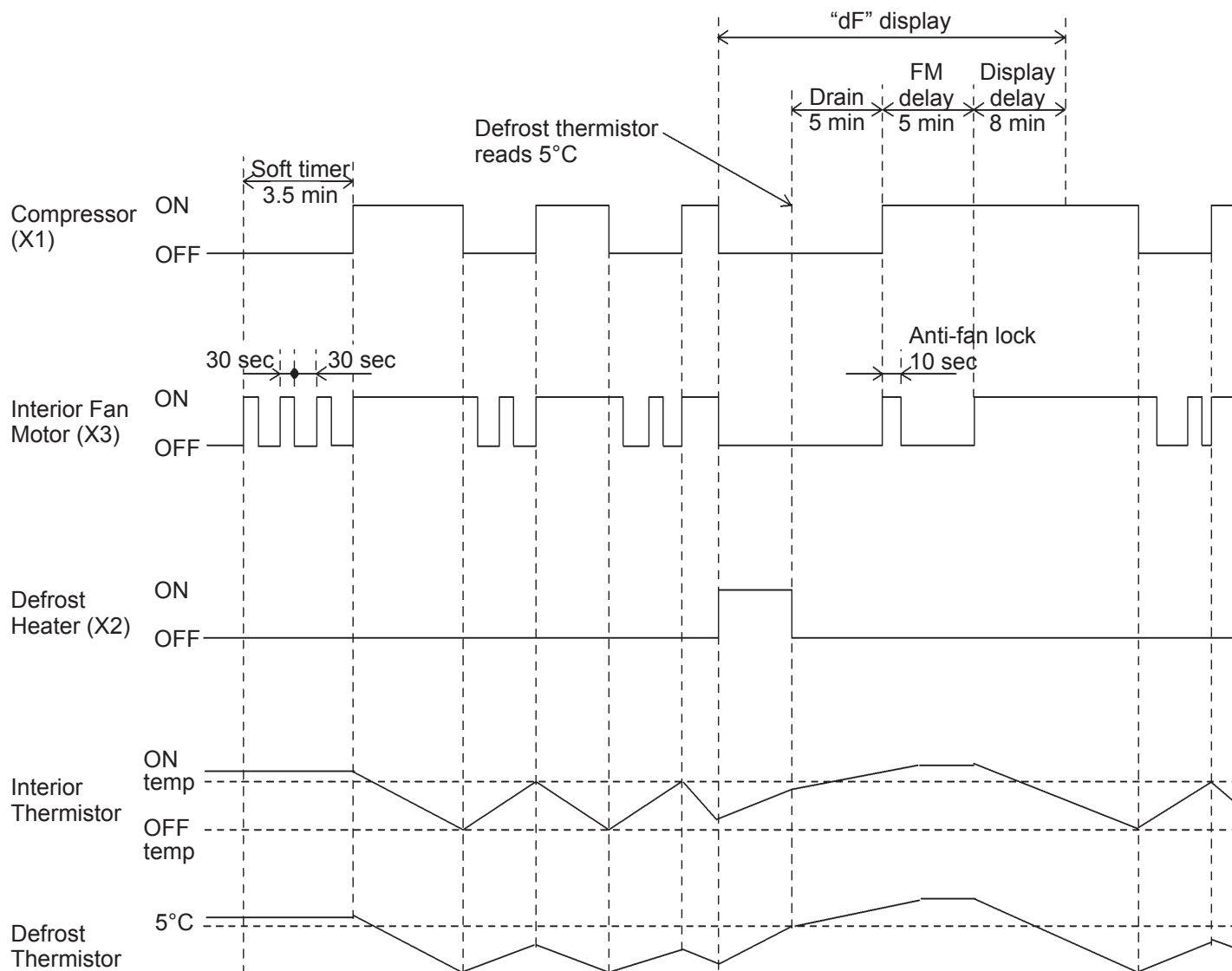


The Interior Fan Motor operates intermittently while the Compressor is OFF.

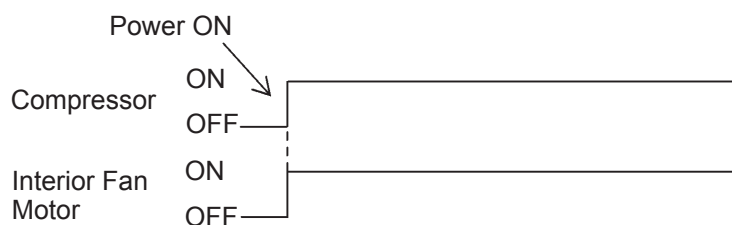
[c] STANDARD MODE (FTE series)



[d] ENERGY SAVING MODE (FTE series)



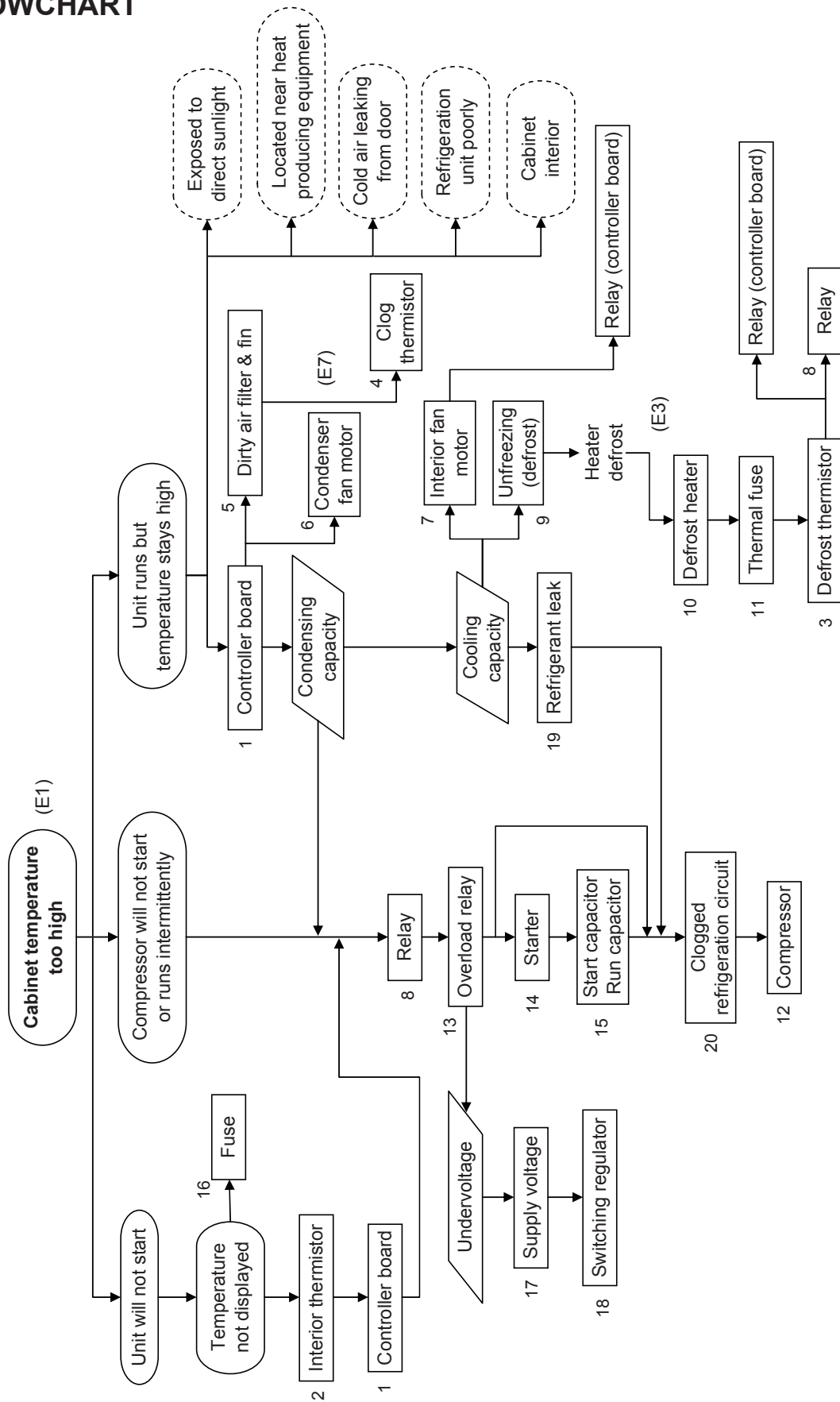
[e] FORCED STARTUP (CANCELING SOFT START)

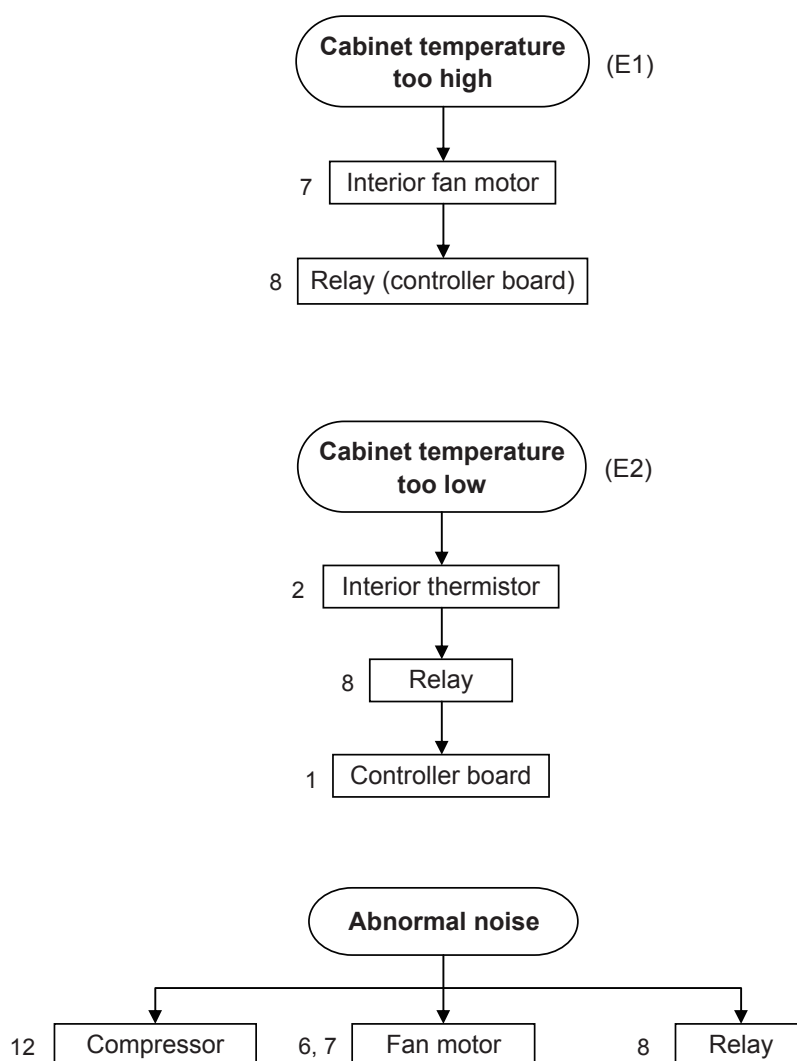


The Compressor and Interior Fan Motor start at the same time.

III. SERVICE DIAGNOSIS

1. FLOWCHART





2. SERVICE DIAGNOSIS

Chart	Item	Possible Cause / Check	Remedy
1	Controller Board	See "3. CONTROLLLER BOARD".	
2	Interior Thermistor		
3	Defrost Thermistor		
4	Clog Thermistor		
5	Air Filter	Clogged.	Clean.
	Air-Cooled Condenser	Dirty fins.	
			No temperature difference between inlet and outlet copper tubes.
6	Condenser Fan Motor	Burning smell.	Replace.
		Fan locked and not movable by hand.	
		Check continuity between leads.	
		Insulation failure.	
7	Interior Fan Motor	See 6 above.	

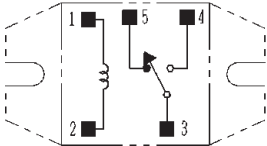
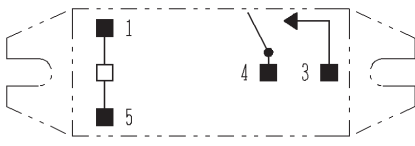
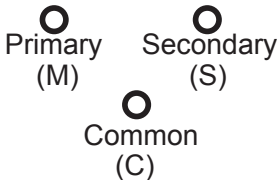
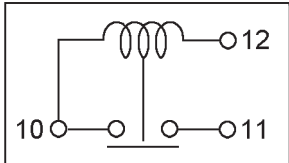
Chart	Item	Possible Cause / Check	Remedy																		
8	Relay	Check continuity between terminals.	Replace.																		
		Press armature if any.																			
		<table><tr><td>Armature</td><td>Normally open contact</td><td>Normally closed contact</td></tr><tr><td>Release</td><td>$\infty \Omega$</td><td>0Ω</td></tr><tr><td>Press</td><td>0Ω</td><td>$\infty \Omega$</td></tr></table>		Armature	Normally open contact	Normally closed contact	Release	$\infty \Omega$	0Ω	Press	0Ω	$\infty \Omega$									
		Armature		Normally open contact	Normally closed contact																
Release	$\infty \Omega$	0Ω																			
Press	0Ω	$\infty \Omega$																			
Power Relay																					
		<div><div></div><div></div></div> <div><div>G4F-11123T</div><div>G2R-1A-T</div></div>																			
9	Defrost Cycle	See "II. 6. TIMING CHART".																			
10	Defrost Heater	Check continuity.	Replace.																		
11	Thermal Fuse Thermostat	Check continuity.	Replace.																		
12	Compressor	Motor noisy and locked.	Replace.																		
		Discharge pipe will not heat up after startup. No pressure difference between high and low sides.	Compression failure. Replace.																		
		Check continuity between terminal and earth.	Not less than $1\text{M}\Omega$ by 500V megger is acceptable.																		
		Check resistance between terminals.	Replace. Too low = burnout ∞ = open circuit																		
		[Reference] Winding resistance (25°C)																			
		<table><tr><th rowspan="2">Model</th><th rowspan="2">Output (W)</th><th colspan="2">Winding Resistance (Ω)</th></tr><tr><th>Primary (M-C)</th><th>Secondary (S-C)</th></tr><tr><td>TL4G</td><td>110</td><td>18.2</td><td>15.1</td></tr><tr><td>FR6G</td><td>150</td><td>12.6</td><td>12.4</td></tr><tr><td>FR8.5G</td><td>215</td><td>8.9</td><td>12.0</td></tr></table>	Model	Output (W)	Winding Resistance (Ω)		Primary (M-C)	Secondary (S-C)	TL4G	110	18.2	15.1	FR6G	150	12.6	12.4	FR8.5G	215	8.9	12.0	Terminal location (front view) <div><div></div><div><div>Primary (M)</div><div>Secondary (S)</div><div>Common (C)</div></div></div>
Model	Output (W)	Winding Resistance (Ω)																			
		Primary (M-C)	Secondary (S-C)																		
TL4G	110	18.2	15.1																		
FR6G	150	12.6	12.4																		
FR8.5G	215	8.9	12.0																		
13	Overload Relay	Loose connection.	Tighten.																		
		Damaged case.	Replace.																		
		Check continuity.																			
14	Starter	Check continuity between terminals.	Replace.																		
		<table><tr><th>Model</th><th>Compressor Model</th></tr><tr><td>117U6004</td><td>TL4G</td></tr><tr><td>117U6000</td><td>FR6G</td></tr><tr><td>117U6015</td><td>FR8.5G</td></tr></table> <div></div>		Model	Compressor Model	117U6004	TL4G	117U6000	FR6G	117U6015	FR8.5G										
Model	Compressor Model																				
117U6004	TL4G																				
117U6000	FR6G																				
117U6015	FR8.5G																				

Chart	Item	Possible Cause / Check	Remedy
15	Start Capacitor Run Capacitor	Deformed or cover damaged.	Replace.
		Leaking impregnating agent.	
		Loose connection.	Tighten.
		Check resistance between terminals. Acceptable if pointer moves instantly when tester is applied and gradually moves back. Not acceptable if pointer reads 0 Ω .	Replace.
16	Fuse	Blown out.	Replace.
17	Supply Voltage	Check for $\pm 6\%$ of rated voltage.	Increase power supply capacity.
			Plug into a separate power receptacle.
18	Switching Regulator	Check for voltage of 220 - 240V AC (primary) and 12V DC (secondary).	Replace.
19	Refrigerant Leak	Compressor discharge pipe will not heat up.	Repair and recharge. Note: Low-side leak requires drying after welding. Replace Drier also.
		Compressor suction pipe will not cool down.	
		Check with leak detector.	
20	Clogged Refrigeration Circuit	Clogged with moisture.	Replace Drier. Replace Capillary Tube.
		Clogged with dust.	

3. CONTROLLER BOARD

[a] SERVICING CONTROLLER BOARD

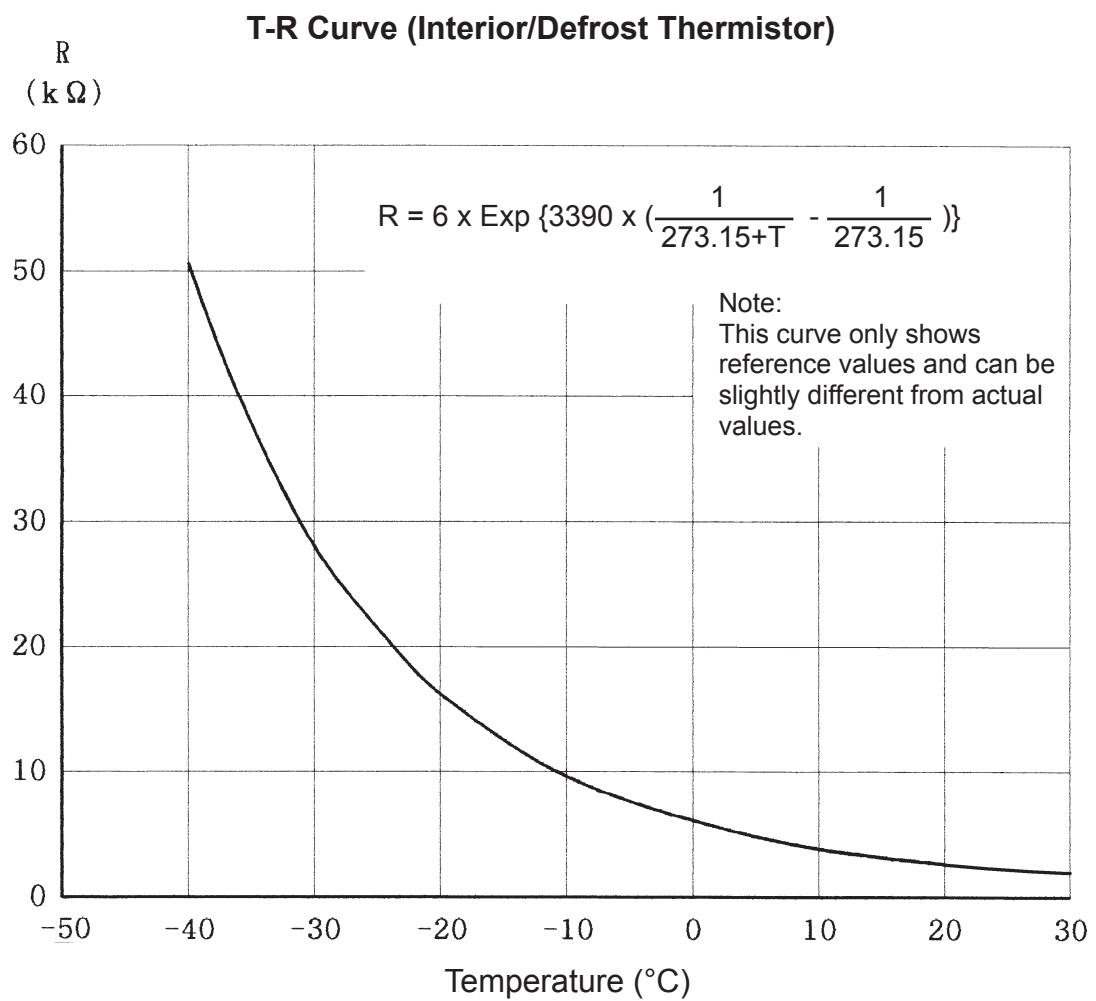
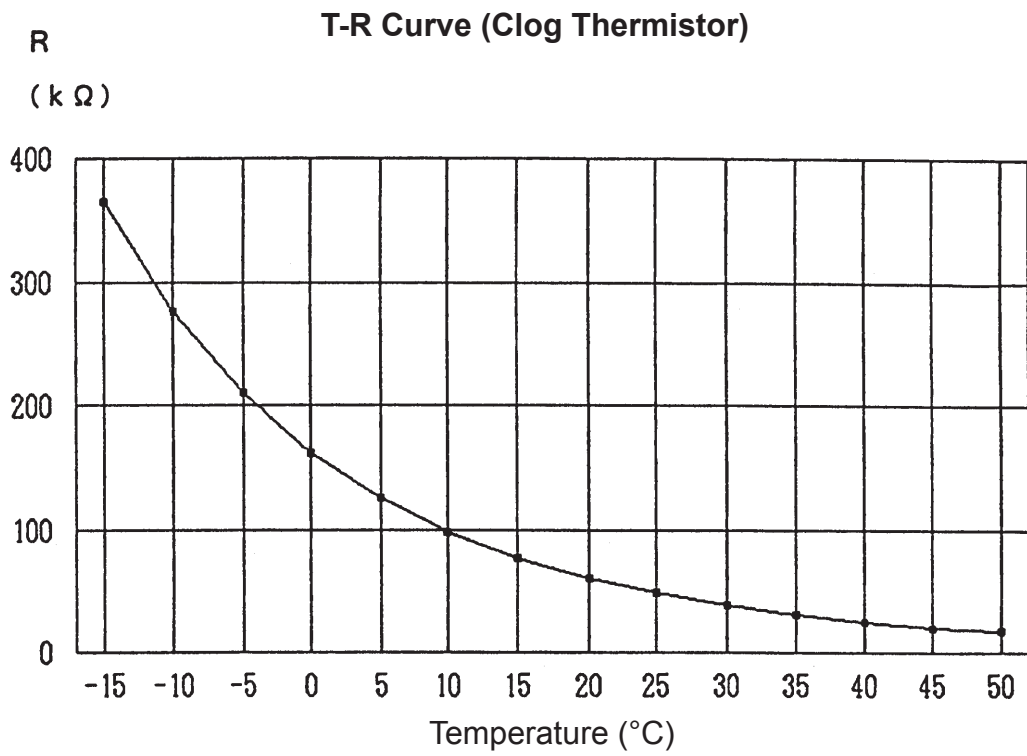
- 1) When receiving a service call, ask the user to turn off the power supply and turn it back on, while watching the unit. This will reset the controller, and in some cases normal operation will resume.
- 2) Keep the following in mind when servicing the Controller Board:
 - * Check that the unit has been earthed properly. If not, the Controller Board will not work properly.
 - * To get static free, always touch the cabinet (earth) before servicing. Electrostatic discharge will cause severe damage to the Controller Board. Also, keep it away from vinyl, plastic or other electrostatically charged products.
 - * Do not touch the reverse side of the Controller Board and tiny electronic devices on it.
 - * Handle the Controller Board by the edges only. Do not push the electric parts and wires.
 - * Do not drop the Controller Board on the floor.

- * Do not short circuit the Relay output terminal coming from the Controller Board.
- * To protect the pattern from damage, place the Controller Board on a flat surface.
- * The Thermistor leads have a thin coating and are potentially breakable. Do not tension the leads.
- * The connectors must not be subjected to tension to prevent disconnection or breakage. After servicing the Controller Board, check for disconnected connectors.
- * The Thermistor is provided with single-wire leads. Do not bend or stretch them (about 400 mm from the end and at lead connections).
- * Do not pinch or weigh down the Thermistor and Thermistor leads. The coatings may be broken, resulting in a short circuit.
- * Keep the Thermistor leads at least 30 mm away from high voltage (100V AC or more) wires, especially fluorescent wires.

[b] CHECKING THERMISTOR

- 1) Disconnect the Thermistor connector from the Controller Board.
- 2) Fill a glass with ice water at a temperature of 0°C. Soak the Thermistor Bulb in the water (at the center of the glass) for 5 minutes.
- 3) Measure the resistance of the Thermistor by the ohm scale of a tester.
- 4) Replace the Thermistor if the resistance is not within the following range (see T-R curves below):

Clog Thermistor:	145 - 175 kΩ (standard: 160 kΩ)
Interior/Defrost Thermistor:	5 - 6.5 kΩ (standard: 6 kΩ)



IV. REMOVAL AND REPLACEMENT OF COMPONENTS

WARNING

Always unplug the refrigerator/freezer before replacing components.

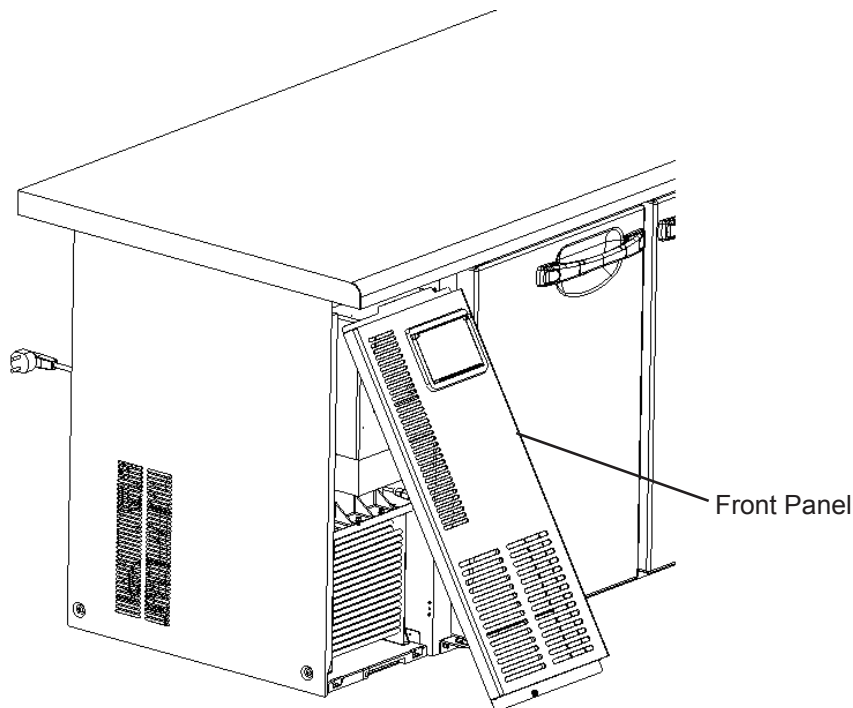
1. REFRIGERATION UNIT

- 1) Remove the pan head screw with washers (stainless steel M5x50) at the bottom of the Front Panel.
- 2) Disconnect the connectors under the Control Box.
- 3) Remove the two hexagon nuts (stainless steel M6) on the Evaporator Box Panel.
- 4) Pull out the Refrigeration Unit Base. Be careful not to damage the refrigeration circuit and not to spill drain water from the Refrigeration Unit Base.
- 5) To replace the removed parts, reverse the above removal procedure.

Note: 1. When pulling out or pushing in the Refrigeration Unit Base, do not let the refrigeration circuit touch the cabinet to prevent gas leaks from the welded parts.

2. Keep the external wiring away from the Fan Motor or Discharge Pipe.

3. Some drain water may remain in the Refrigeration Unit Base. When pulling out the Refrigeration Unit Base, be careful not to spill drain water and wet the floor.



2. REFRIGERATION CIRCUIT

[a] REFRIGERANT

Refrigerant R134a (RTE series) or R404A (FTE series) used for this refrigerator/freezer is not flammable or poisonous itself. It also provides remarkably lower pressure than ammonia or similar substances at the same condensing temperatures.

[b] COMPRESSOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Use a screwdriver to remove the clamp from the Terminal Cover enclosing the Compressor’s electrical parts.
- 3) Take off the Terminal Cover, and remove the Start Capacitor and Starting Relay.
- 4) Recover the refrigerant from the Access Valve, and store it in a proper container, if required by an applicable law.
- 5) Disconnect the Discharge and Suction Pipes using brazing equipment.
- 6) Remove the three bolts (M6x35) securing the Compressor.
- 7) To replace the removed parts, reverse the above removal procedure.

Note: 1. To recharge the refrigerant, install a stop valve in the access line.

2. Evacuation time must be at least 1 hour.
3. To prevent oxidation, braze or solder the pipes with nitrogen gas flowing.
4. Check for gas leaks, remove flux and oxide film, and apply anti-corrosion treatment.
5. Always charge R404A (FTE series) in the liquid stage to maintain the blend consistency.

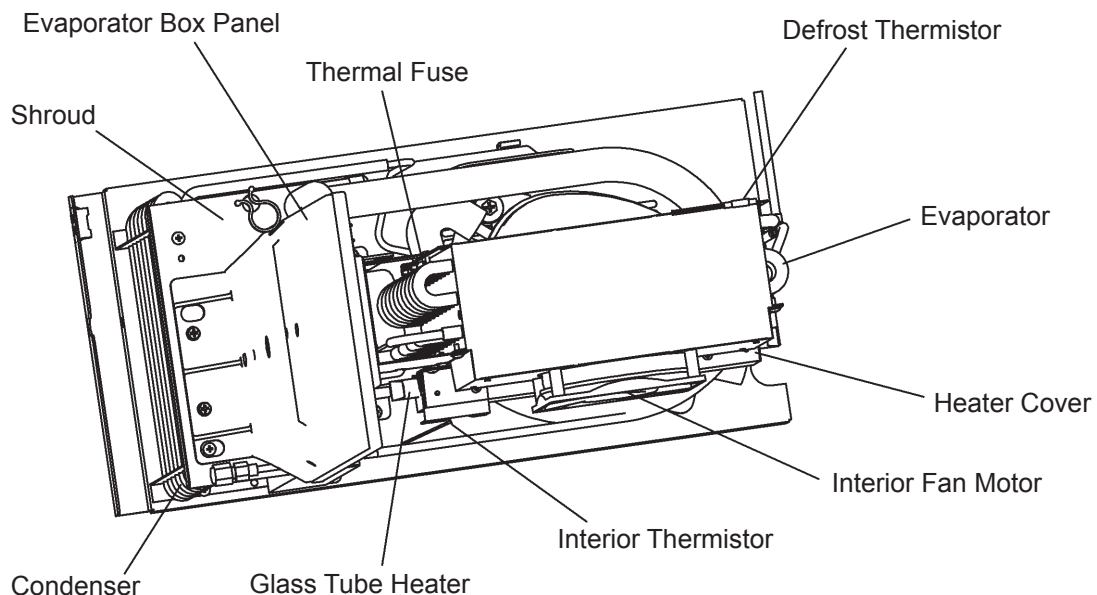
[c] EVAPORATOR AND DEFROST HEATER

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Recover the refrigerant from the Access Valve, and store it in a proper container, if required by an applicable law.

- 3) Remove the Clip and Defrost Thermistor from the top of the Evaporator.
- 4) Remove the truss head tapping screw (stainless steel 4x8) securing the Interior Thermistor Plate located under the Interior Fan Motor on the Evaporator Cover.
- 5) Remove the two truss head tapping screws (stainless steel 4x16) and U-Band securing the refrigeration circuit inside the Evaporator Box Panel.
- 6) Disconnect the Glass Tube Heater and Interior Fan Motor leads, and remove the Clip and Thermal Fuse.
- 7) Remove the two truss head tapping screws (stainless steel 4x8) securing the Heater Cover.
- 8) Remove the six truss head tapping screws (stainless steel 4x8) securing the Evaporator, Evaporator Cover, and Evaporator Bracket.
- 9) Disconnect the Evaporator from the refrigeration circuit using brazing equipment.
- 10) To replace the removed parts, reverse the above removal procedure.

Note: 1. See Notes 1 - 5 for “[b] COMPRESSOR”.

2. For RTE series, the Glass Tube Heater must be fit to the U-notches at the bottom of the Heater Cover.



[d] CONDENSER

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Recover the refrigerant from the Access Valve, and store it in a proper container, if required by an applicable law.
- 3) Remove the Evaporator Box Panel from the Shroud on top of the Condenser by unscrewing the two hexagon head bolts with washers (5x10).
- 4) Remove the Shroud from the Condenser by unscrewing the two truss head tapping screws (stainless steel 4x8).
- 5) Remove the two truss head tapping screws (stainless steel 4x16) securing the Condenser.
- 6) Disconnect the Condenser from the refrigeration circuit using brazing equipment.
- 7) To replace the removed parts, reverse the above removal procedure.

Note: See Notes 1 - 5 for “[b] COMPRESSOR”.

3. CONTROL BOX

- 1) Remove the pan head screw with washers (stainless steel M5x50) at the bottom of the Front Panel.
- 2) Remove the connectors under the Control Box and the Thermistor connectors.
- 3) Remove the Control Box from the Evaporator Box Panel by unscrewing the two truss head tapping screws (stainless steel 4x16).
- 4) Remove the Control Box Cover.
- 5) Replace the parts inside the Control Box.
- 6) To replace the removed parts, reverse the above removal procedure.

4. FAN MOTORS

[a] CONDENSER FAN MOTOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.

- 2) Disconnect the Condenser Fan Motor leads.
- 3) Remove the Condenser Fan Motor with the Bracket by unscrewing the two truss head tapping screws (stainless steel 4x16).
- 4) Take the Condenser Fan Motor off the Bracket.
- 5) To replace the removed parts, reverse the above removal procedure.

Note: The nuts securing the Fan Motor must be turned clockwise to loosen and counterclockwise to tighten.

[b] INTERIOR FAN MOTOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Disconnect the Interior Fan Motor leads.
- 3) Remove the Interior Fan Motor from the Evaporator Cover by unscrewing the four pan head machine screws with washers (stainless steel 4x30).
- 4) To replace the removed parts, reverse the above removal procedure.

5. THERMISTORS

[a] INTERIOR THERMISTOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Cut the cable tie to remove the Interior Thermistor from the Thermistor Plate located under the Interior Fan Motor on the Evaporator Cover.
- 3) To replace the removed parts, reverse the above removal procedure.

[b] DEFROST THERMISTOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Remove the Clip and Defrost Thermistor from the top of the Evaporator.
- 3) To replace the removed parts, reverse the above removal procedure.

[c] CLOG THERMISTOR

- 1) Pull out the Refrigeration Unit Base according to steps 1) through 4) of “1. REFRIGERATION UNIT”.
- 2) Remove the Clip and Clog Thermistor's element from the Condenser Outlet Pipe.
- 3) Cut the cable tie to disconnect the Thermistor leads.
- 4) To replace the removed parts, reverse the above removal procedure.

6. DOOR GASKET

[a] REMOVAL

- 1) Open the Door.
- 2) Detach the Door Gasket from the Door Pack.

[b] REPLACEMENT

- 1) Spray water on the Door Pack Channel with a sprayer.
- 2) Fit the four corners of the Door Gasket into those of the Door Pack Channel.
- 3) Push in each part of the Door Gasket from both sides.

Note: After fitting the Door Gasket, check every part for tightness and security.

